52p.

THE TRIUMPH OF

Astronaut L. Gordon Cooper, Jr. and the Faith 7

May 15–16, 1963

22 Orbits —— 34 Hrs. 20½ Min. 546,185 Miles

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Manned Spacecraft Center

Happy Landing!

Safe aboard Carrier Kearsarge, Gordon Cooper smiles broadly just after Faith 7 hatch was blown—May 16

NASA Astronaut L. Gordon Cooper, a major in the U.S. Air Force, was lifted into space May 15, 1963, and after 22 orbits he returned to earth to complete another step toward the Nation's goal of landing a man on the moon in this decade.

Born in Shawnee, Okla., on March 6, 1927, Cooper is 5 feet 9 inches tall, weighs 148 pounds and has a fair complexion with blue eyes and brown hair.

He is the son of the late Col. Leroy G. Cooper, U.S. Air Force, and Mrs. Hattie Cooper, who now lives in Tecumseh, Okla.

Cooper was married to the former Trudy Olson of Seattle, Wash., while living in Hawaii in 1947. They have two daughters, Janita L., 13, and Camala K., 14, and now live in Taylor Village, Tex., a Houston suburb.

He attended primary and secondary schools in Shawnee, Okla., and Murray, Ky. He entered the Marine Corps in 1945 and attended the Naval Academy Preparatory School. He was a member of the Presidential Honor Guard in Washington until discharged in 1946.

After 3 years as a student at the University of Hawaii in Honolulu, he was commissioned in the U.S. Army. Transferring to the U.S. Air Force, he was called to extended active duty for flight training in 1949.

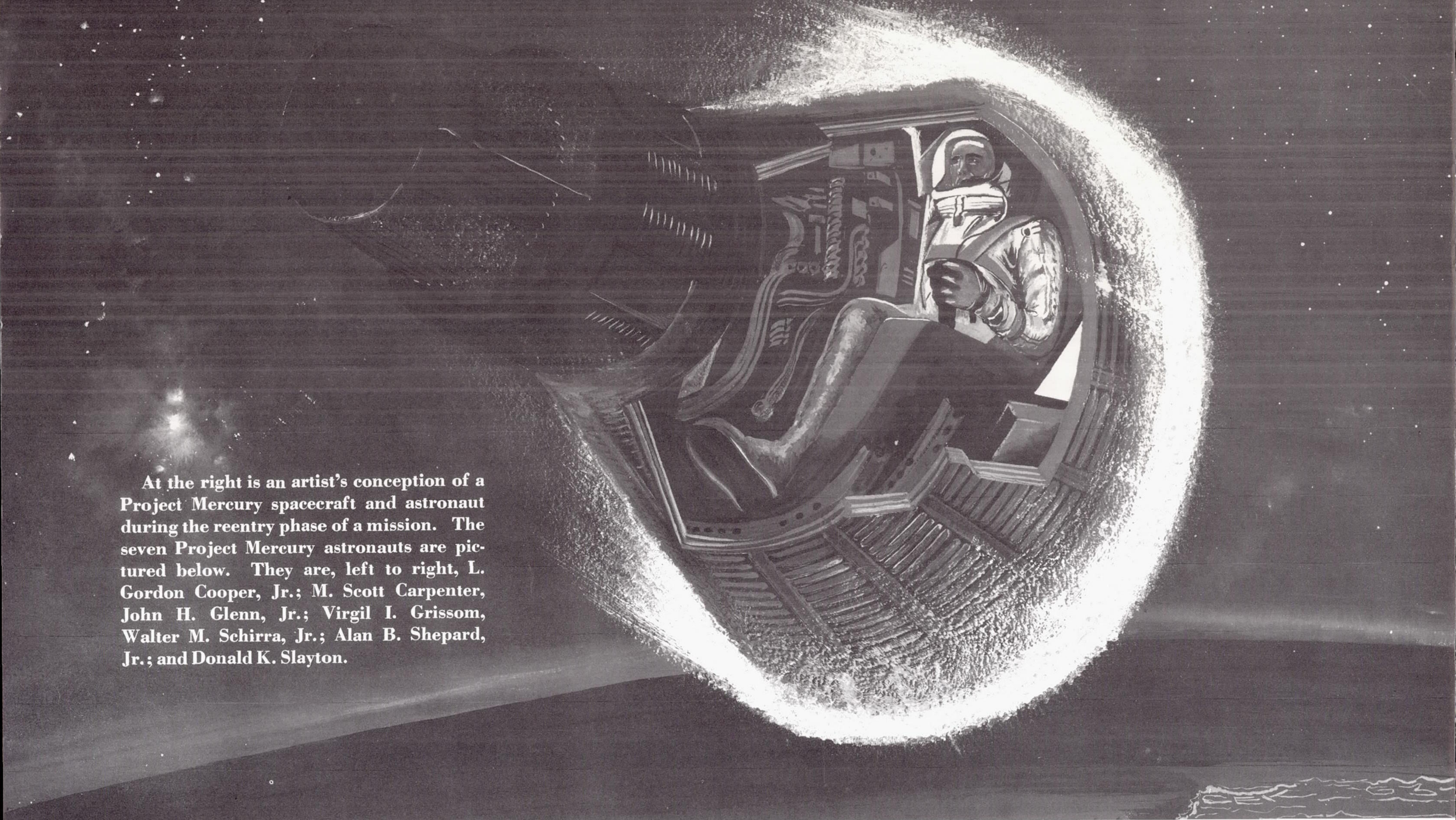
After completion of his flight training, Cooper was assigned to the 86th Fighter Bomber group in Munich, Germany, where he flew F–84's and F–86's for 4 years and at the same time went to night school with the European Division, University of Maryland. After attending the Air Force Institute of Technology at Wright-Patterson Air Force Base, Ohio, for 2 years, he received his bachelor's degree in aeronautical engineering in 1956.

Assigned to the Air Force Experimental Flight Test School at Edwards Air Force Base, Calif., he was graduated in April 1957 and assigned to the Performance Engineering Branch of the Flight Test Division at Edwards Air Force Base where he tested experimental fighter aircraft and worked as an aeronautical engineer.

In April 1959, Cooper was selected as 1 of the 7 Project Mercury astronauts by the National Aeronautics and Space Administration from among more than 500 test pilots from all branches of the U.S. military services who had been considered.

Cooper, who accumulated more than 2,600 hours of flying time of which 1,600 are in jet fighters, may now add 34 hours and 20 minutes of weightless spaceflight to his record.

◀ **President John F. Kennedy pins the National Aeronautics and Space Administration's Distinguished Service Medal on Astronaut L. Gordon Cooper, Jr., in ceremonies held in the Rose Garden at the White House, May 21, 1963.**



At the right is an artist's conception of a Project Mercury spacecraft and astronaut during the reentry phase of a mission. The seven Project Mercury astronauts are pictured below. They are, left to right, L. Gordon Cooper, Jr.; M. Scott Carpenter, John H. Glenn, Jr.; Virgil I. Grissom, Walter M. Schirra, Jr.; Alan B. Shepard, Jr.; and Donald K. Slayton.

PROJECT MERCURY

The Mercury-Atlas 9 mission, with Astronaut L. Gordon Cooper, Jr., as pilot, was the sixth manned flight in Project Mercury—the first of three programs designed to land Americans on the moon and return them to the earth before the end of this decade—a national goal outlined before the Congress by President Kennedy on May 25, 1961.

The President issued this challenge just 20 days after Astronaut Alan B. Shepard, Jr., achieved America's first manned space flight—a sub-orbital flight—in his "Freedom 7" spacecraft.

Since that time, there have been five additional manned flights—each planned to follow carefully the step-by-step progression determined as necessary at the outset of the program by Manned Spacecraft Center Director, Dr. Robert R. Gilruth, and his colleagues. Specific objectives have been assigned to each flight.

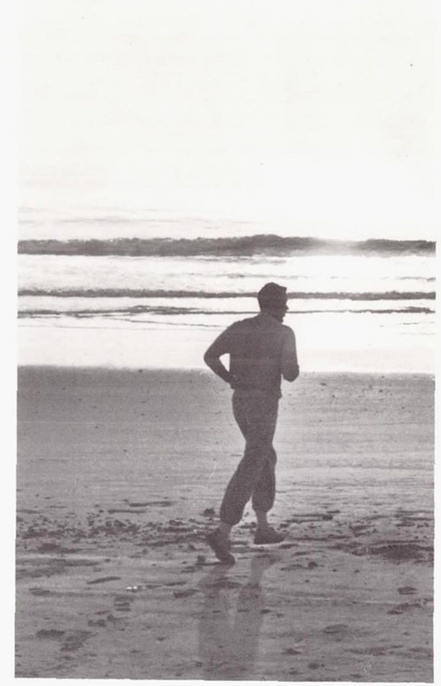
Shepard's flight was followed by another sub-orbital flight by Astronaut Virgil I. Grissom, three-orbit flights by Astronauts John H. Glenn, Jr., and M. Scott Carpenter, a six-orbit flight by Astronaut Walter M. Schirra, and the latest—Cooper's 22-orbit flight on May 15–16, 1963.

The seven Project Mercury astronauts were chosen in April 1959 and, since that time, they have been on a constant training schedule. This has required that they stay up-to-date on all facets of training concerning development of the many and varied systems in both the launch vehicle and the Mercury spacecraft, spend many hours in the procedures trainer, the centrifuge and other simulators designed to provide the sensations and problems they would encounter in space flight, and additionally, to maintain flying proficiency in high performance jet aircraft and to maintain physical conditioning through a program of their own choosing.

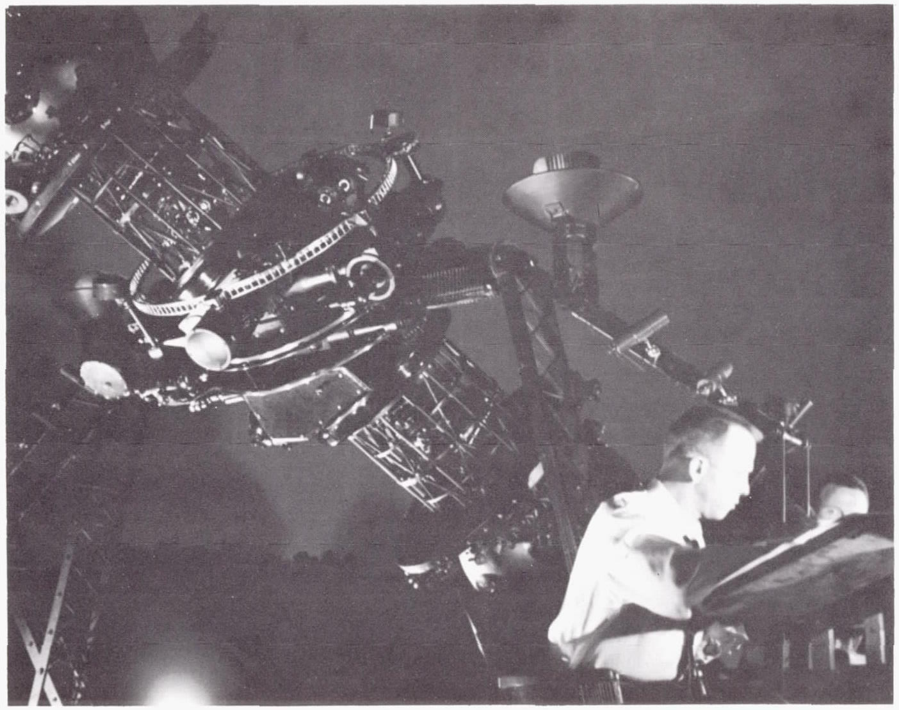
The MA–9 flight was, therefore, the achievement of an immediate goal set by Cooper 49 months before—that of a space flight. During the interim period, all activities have pointed to that goal.

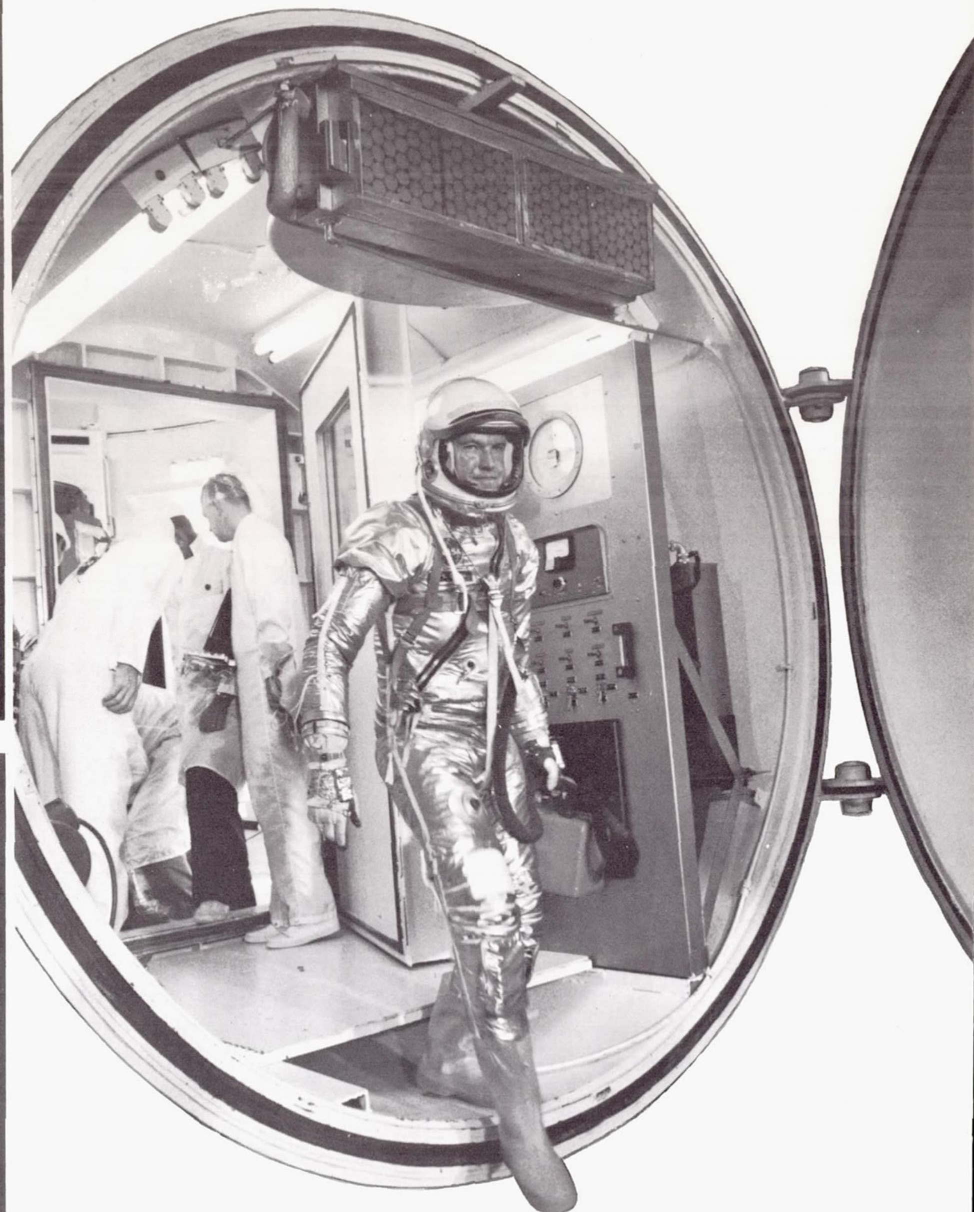
Now Cooper and his six fellow Mercury astronauts, joined by the nine new astronauts named to Manned Spacecraft Center's flight team in September 1962 look forward to other longer and more challenging trips in space as they make history with Projects Gemini and Apollo.

Silhouetted against the sunrise, Cooper takes an early morning run on Cocoa Beach at Cape Canaveral to keep his peak physical condition.

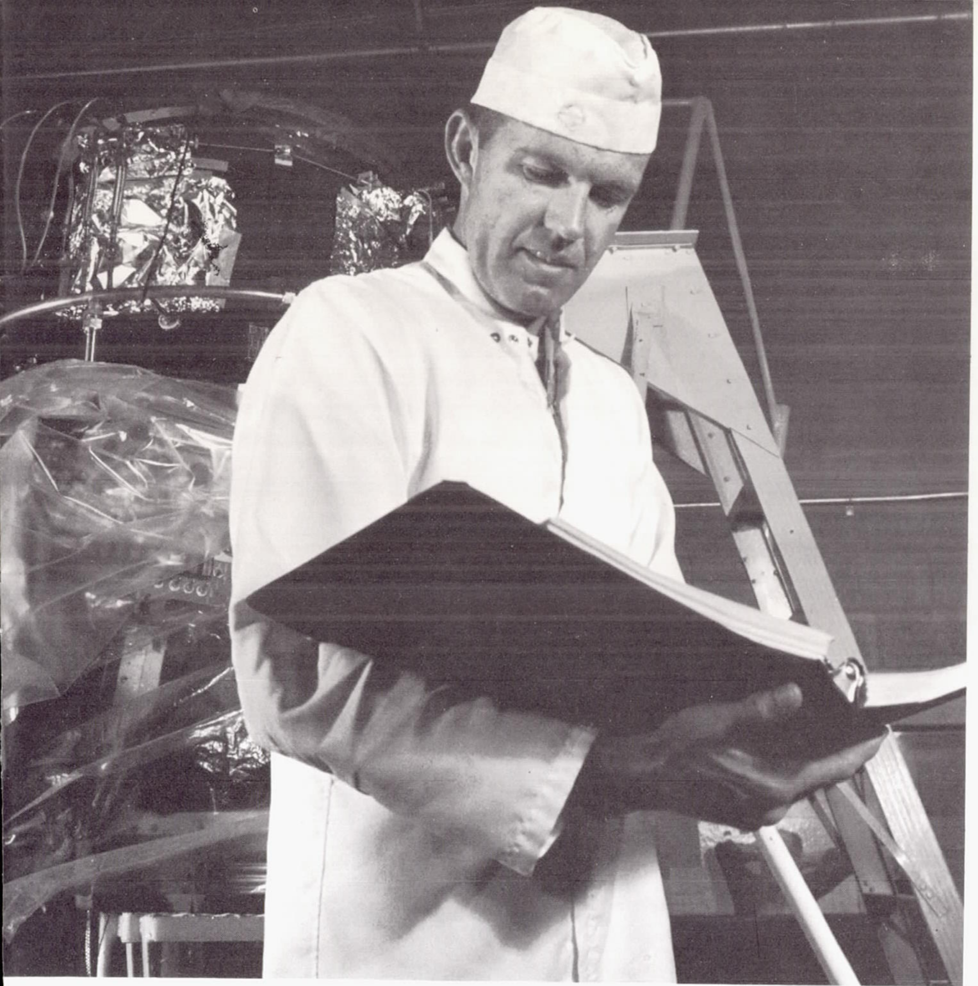


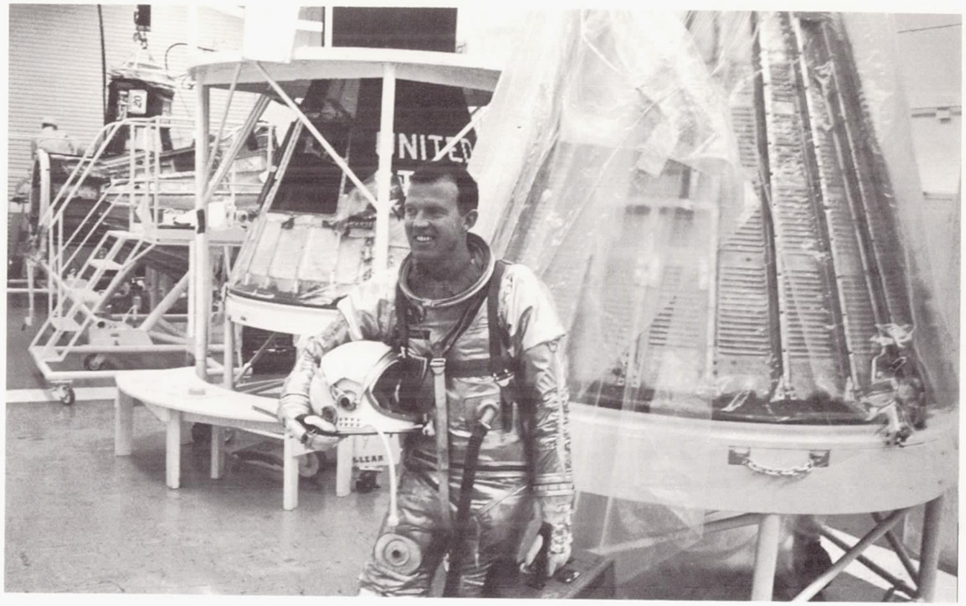
Cooper practices his photography by using an underwater camera while, at the same time, he keeps in trim by swimming.

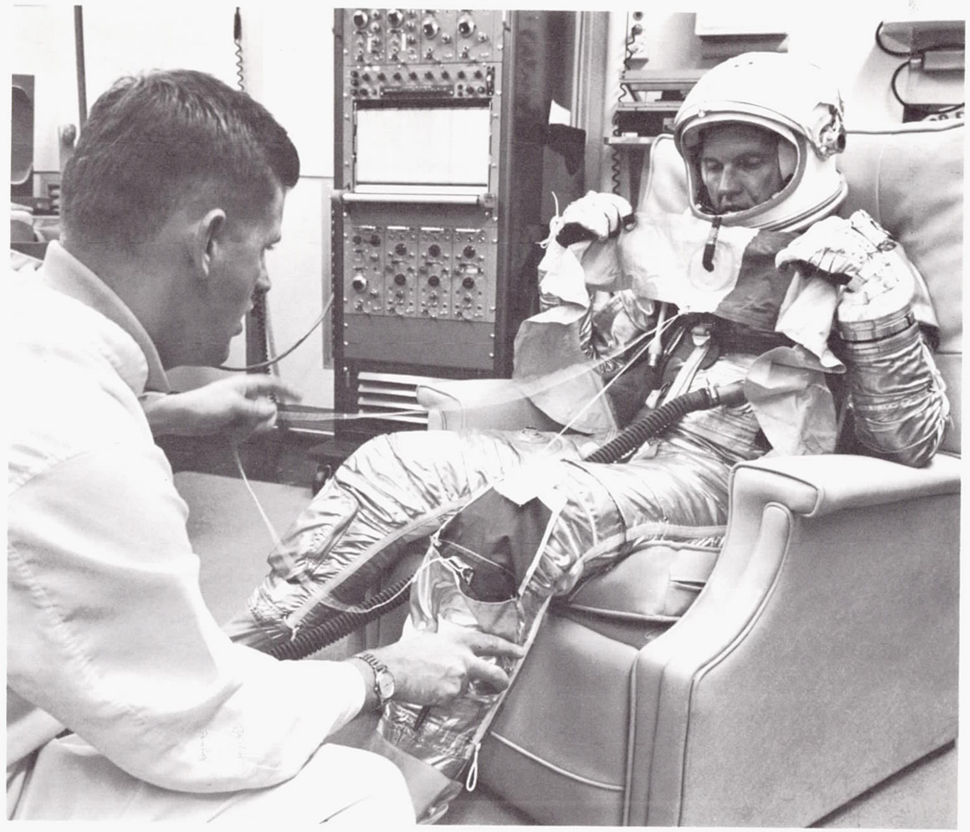




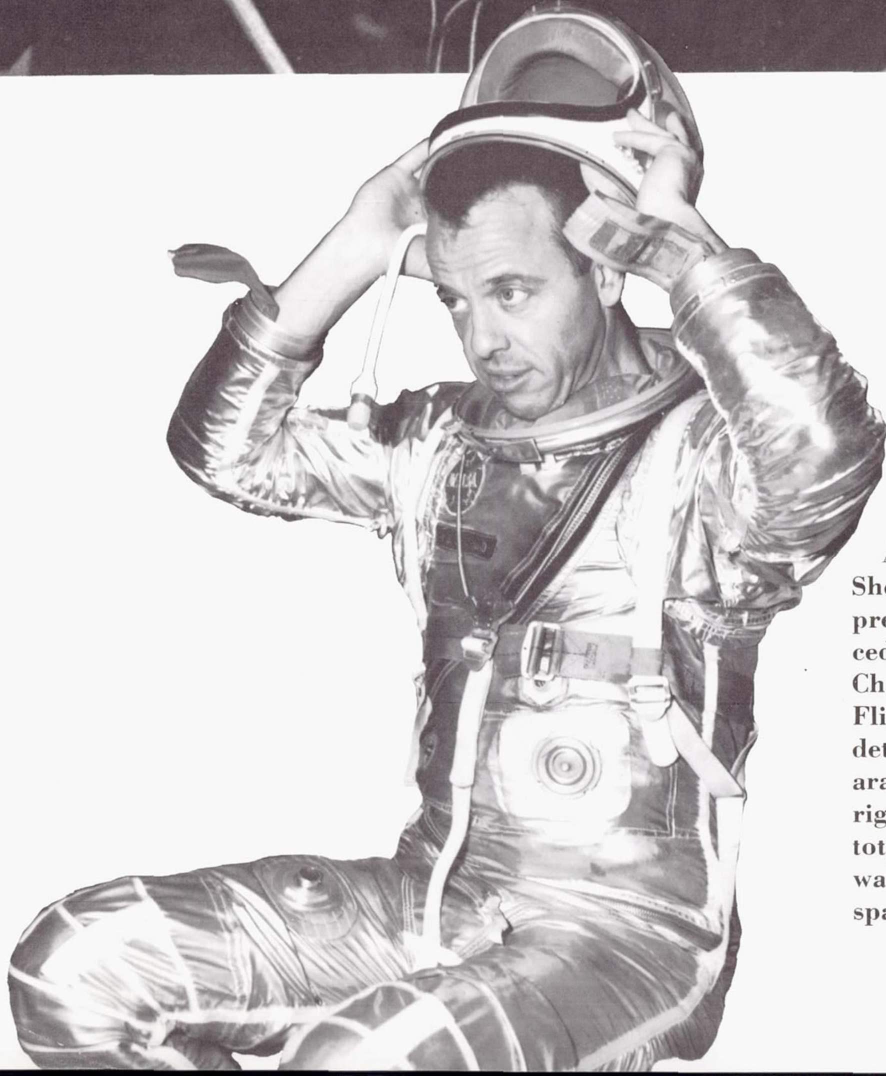
At upper left, Cooper flies an F–102 aircraft above the MA–9 launch site at Cape Canaveral, Florida. At lower left, Astronaut Alan B. Shepard (left) and Cooper use the Zeiss projector at the Morehead Planetarium at the University of North Carolina. Above, Cooper emerges from the pressure chamber at Hangar "S" at Cape Canaveral after a test of "Faith 7's" environmental control systems and flight worthiness in a high altitude environment .



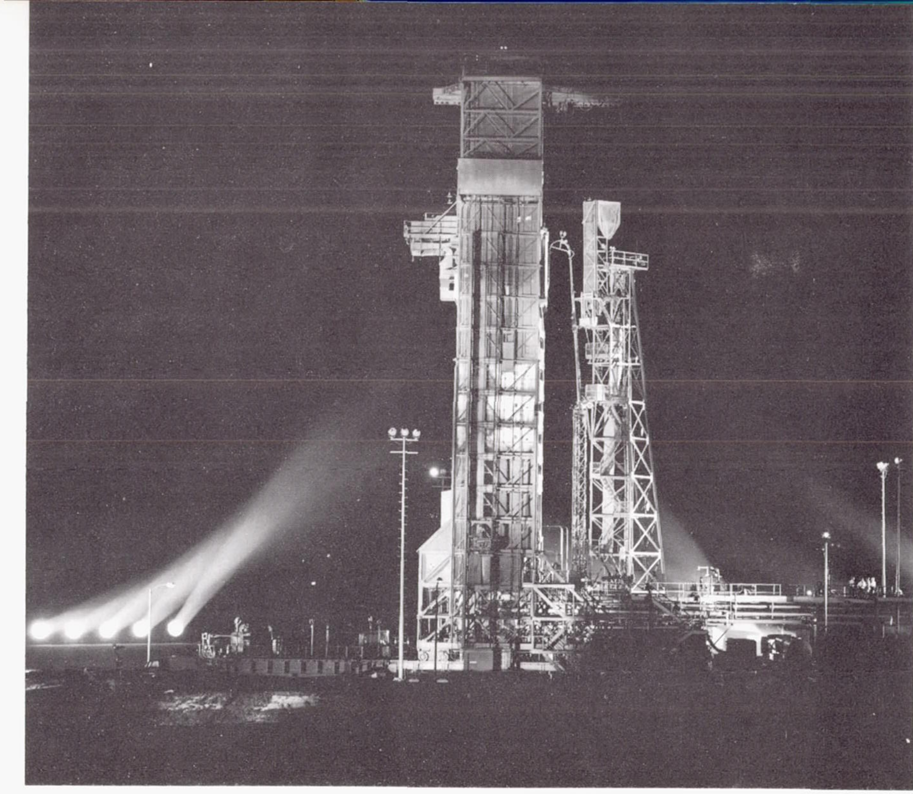




Above Cooper studies test data on the "Faith 7" spacecraft in the Reaction Control Cell in preparation for his flight. Above right, he leaves Hangar "S" white room carrying the portable air conditioner of his spacesuit after completing a familiarization checkout in the "Faith 7." At right, Al Rochford, MSC spacesuit technician, helps Cooper check his life vest which he carried in a pocket on the lower left leg of his pressure suit during his mission.



At left, MA–9 backup pilot, Alan B. Shepard, Jr., suits-up in Hangar "S" in preparation for a simulation in the procedures trainer. Above, Cooper and Christopher C. Kraft (right), Chief of Flight Operations Division, MSC, discuss details of the MA–9 flight plan in preparation for the 22-orbit mission. At right, Astronaut Cooper tries out a prototype net couch in Hangar "S" which was under evaluation for possible use in spacecraft.



Pad 14 with all its vital equipment is a beautiful sight during the early morning hours May 15.

Astronauts Slayton, Cooper, Schirra, and Dr. H. A. Minners have breakfast in the astronauts mess before Cooper is suited up for his flight.

PRELAUNCH

Shortly after midnight on May 15, Astronaut Alan B. Shepard, Jr., rode up the elevator at Pad 14 at Cape Canaveral, entered the "Faith 7" spacecraft of Gordon Cooper, and for the second morning in succession, filled Cooper's place for the next 4 hours as the count-down to lift-off continued.

Several hours later, at 2:50 a.m., EST, Dr. Howard K. Minners wakened Cooper in the crew quarters at Hangar "S", and a short time later Cooper had breakfast with Dr. Minners, Astronauts Donald K. "Deke" Slayton and Walter Schirra, and Flight Operations Director Walter C. Williams. The menu consisted of orange juice, filet mignon, scrambled eggs, and dry toast.

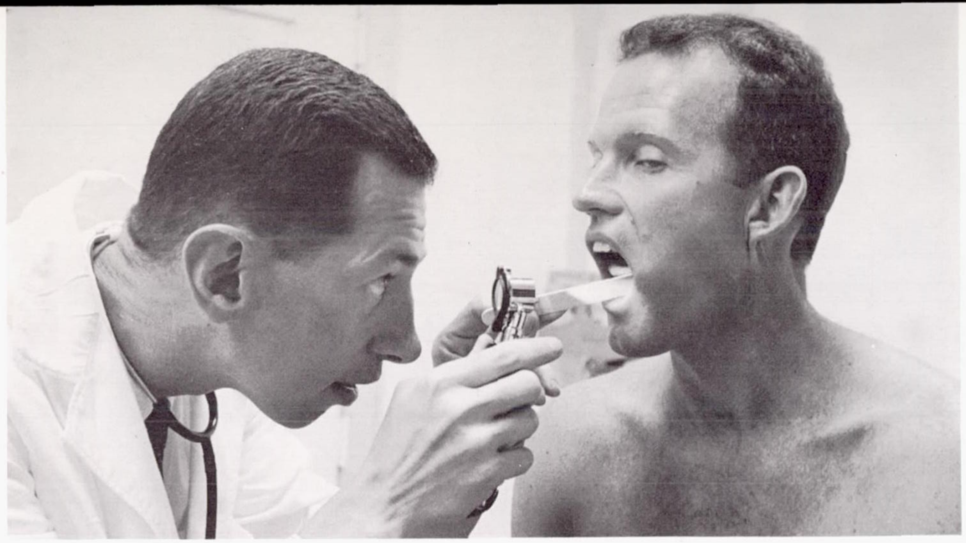
The body sensors were applied to Cooper and the final physical was completed at 4:22 a.m. Then he was suited up for his flight and the suit was pressure-tested. At 4:57 a.m. Cooper left the crew quarters and went out the east door of Hangar "S", followed by Schirra, Slayton, Minners, and suit technician Joe Schmidt, and entered the transfer van.

The van departed from the Hangar "S" at 5:02 a.m. and it required 16 minutes to reach its parking place near the elevator at Pad 14—3½ miles away.

Cooper left the transfer van at 5:32 a.m., accepted the best wishes of the pad crew and entered the elevator for his ride up the gantry and was assisted into his spacecraft at 5:36 a.m.

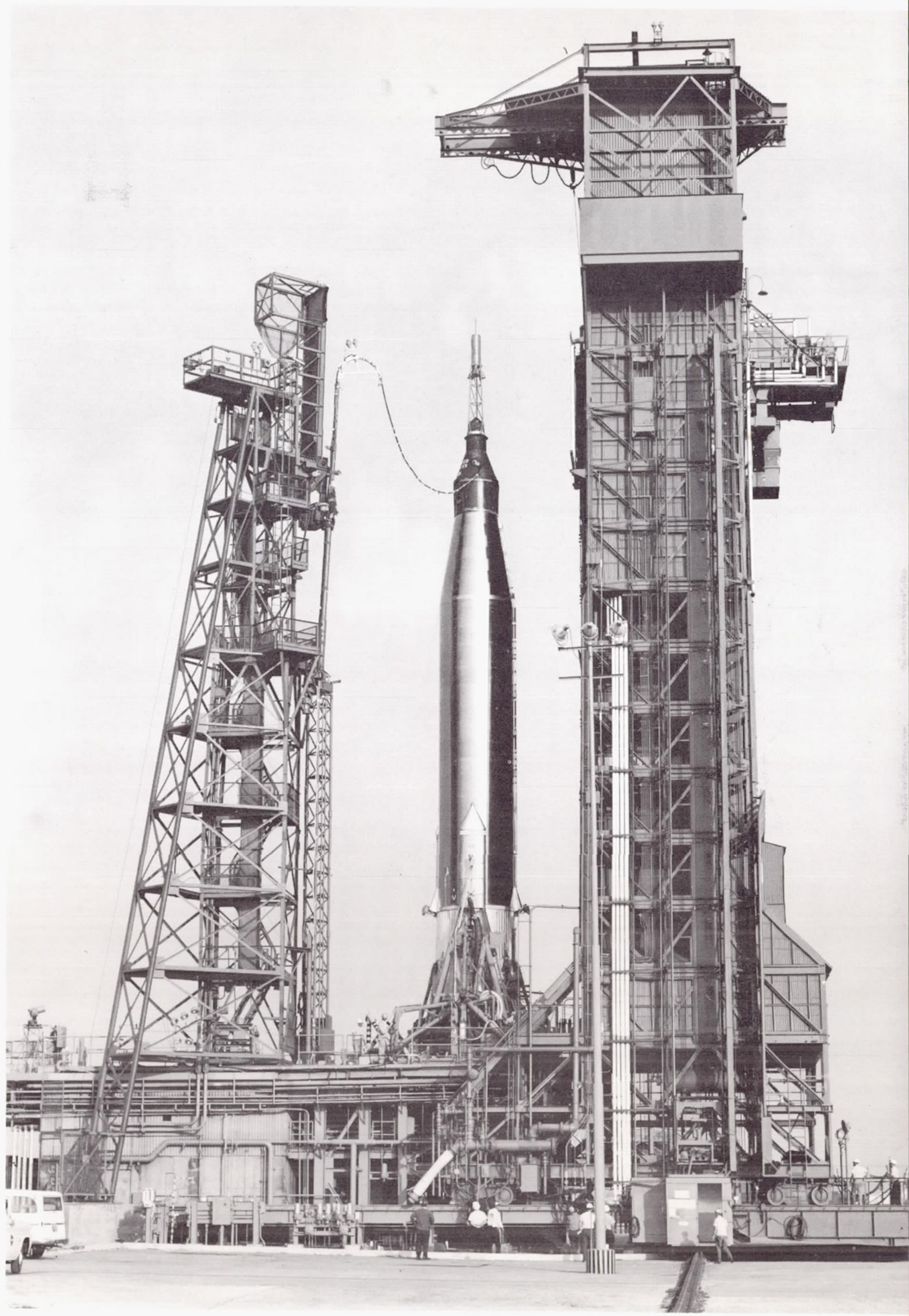
Cooper had gone through the same routine the morning before, however, on that occasion, after the flight had been scrubbed following several holds, he had spent nearly 6 hours in his spacecraft before emerging and returning to Hangar "S".

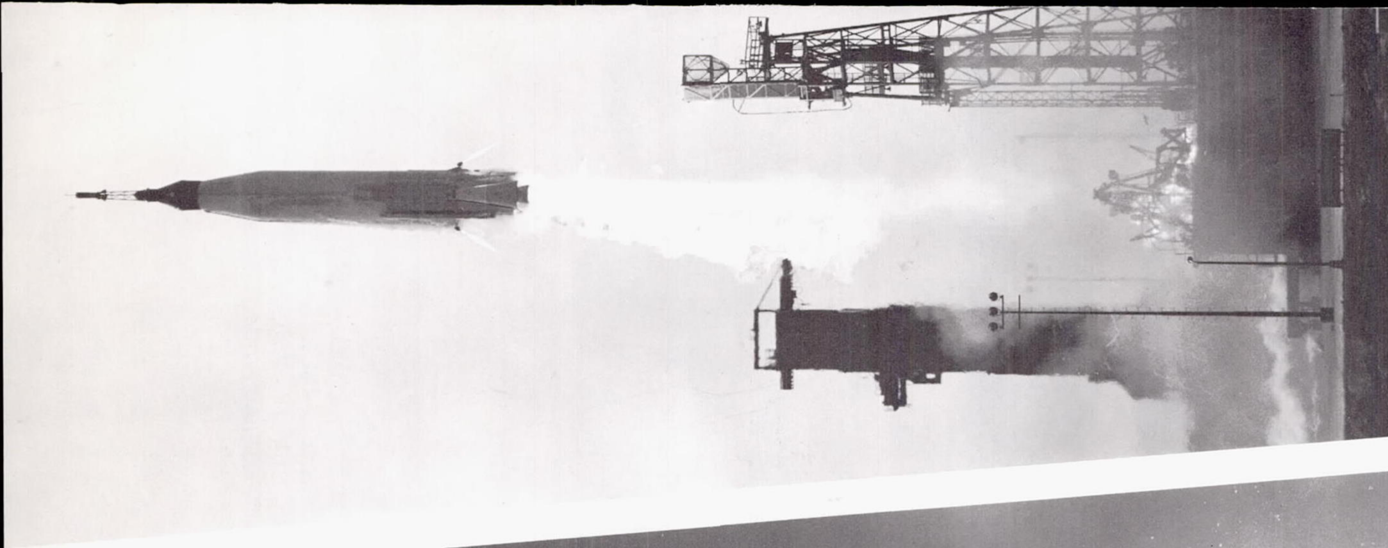
On the morning of May 15 there was only one brief hold and Cooper and "Faith 7" started their historic trip at 8:04 a.m.

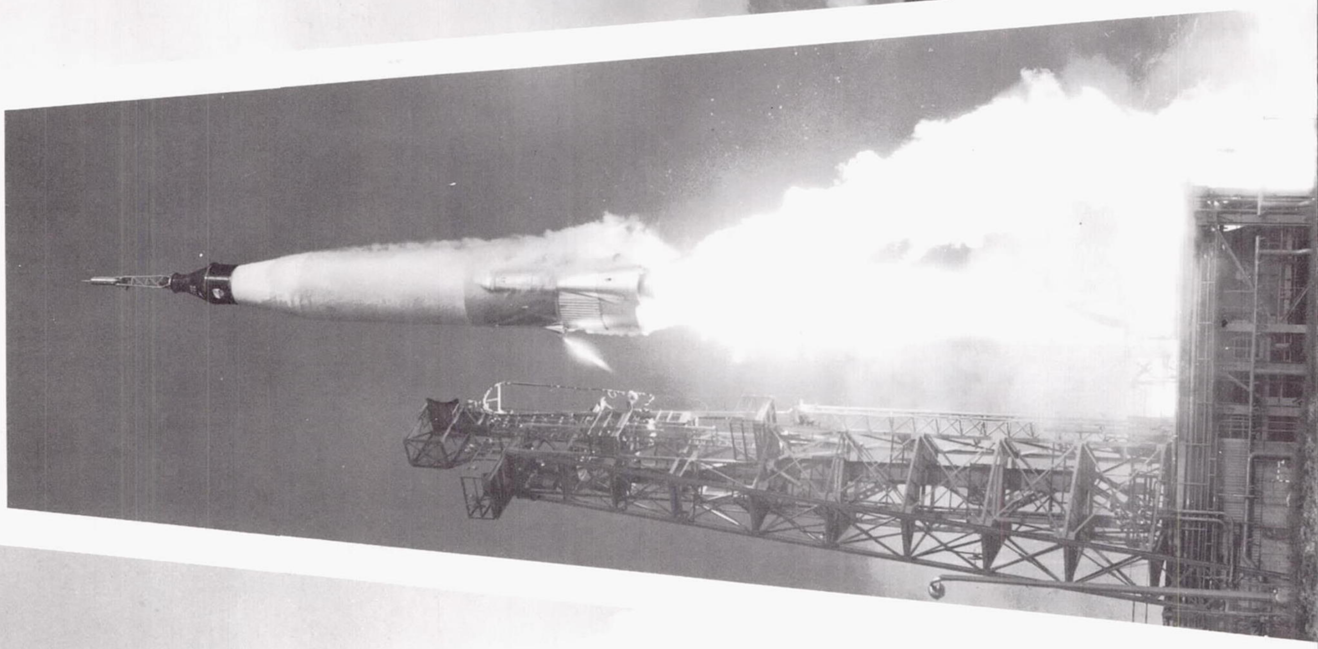


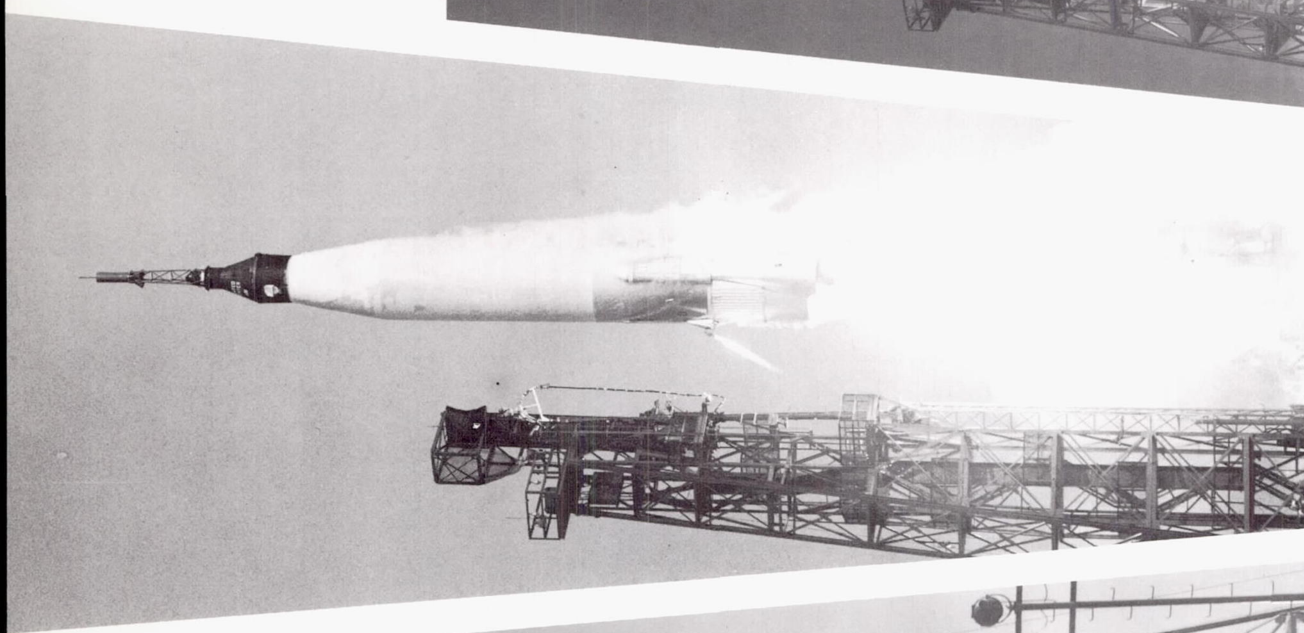
Above, Dr. Minners examines Cooper, prior to declaring him fit for his trip. Below, Cooper leaves the transfer van, followed by Slayton. Right, followed by Schirra, Cooper leaves Hangar "S" to enter the transfer van.

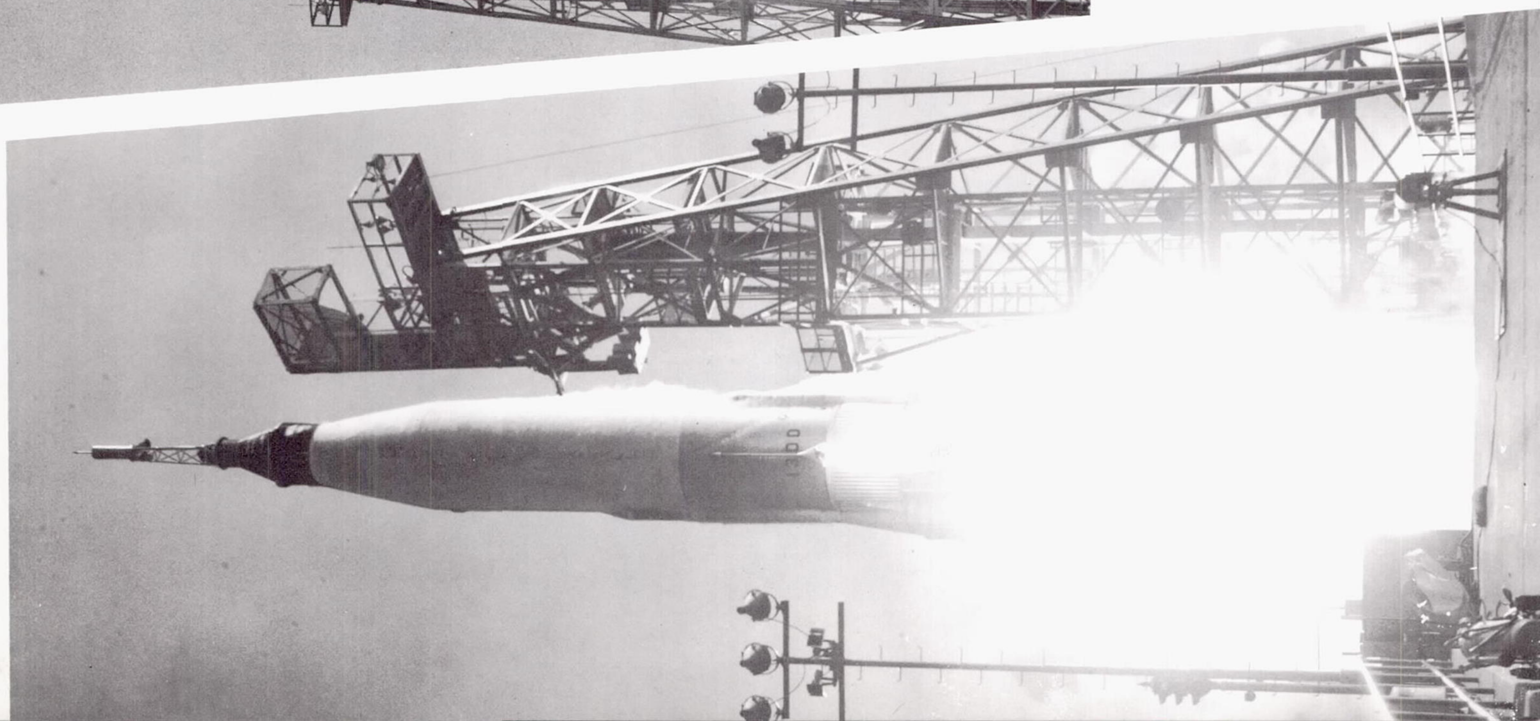
Below, Cooper is assisted into his "Faith 7" spacecraft on launch morning. Right, the gantry is pulled back from its position around the MA–9 vehicle, and the Atlas 130D launch vehicle with the "Faith 7" atop stands poised and ready.









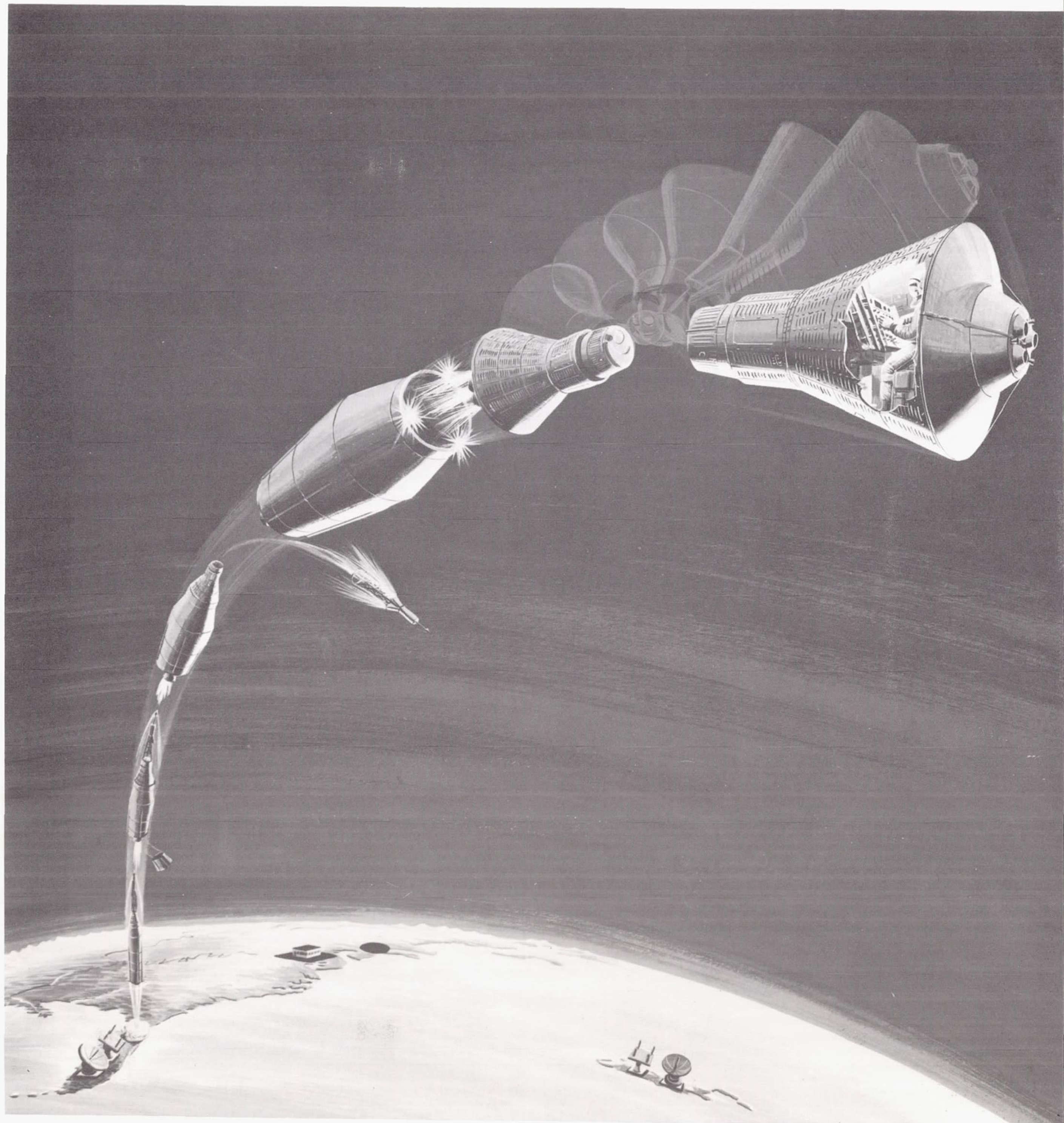


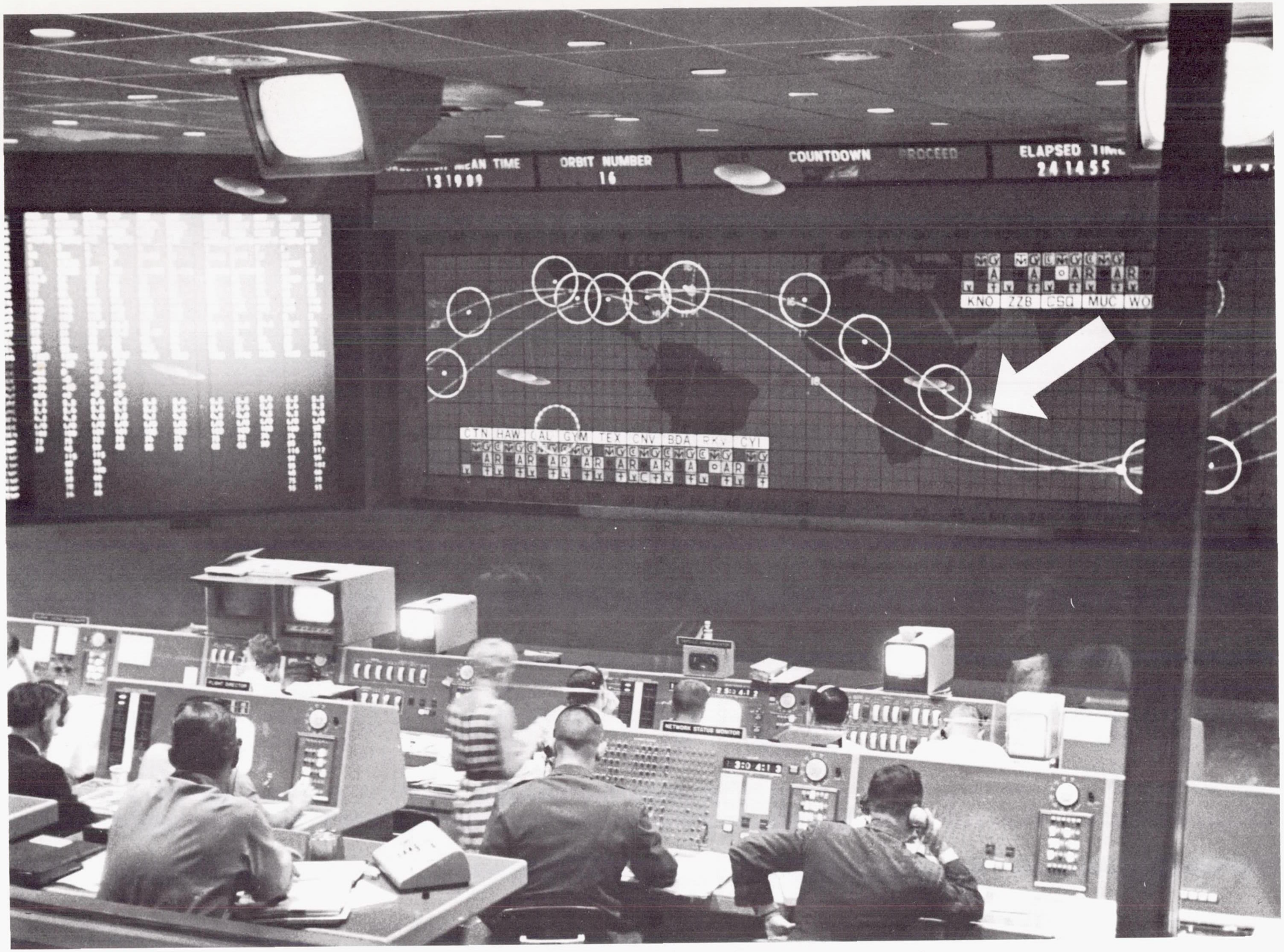
The orbital path achieved for the MA–9 mission was the result of split-second programing of the launch vehicle staging, velocity, pitch-over (turnabout), yaw control and engine cutoff. The Atlas accelerated continuously during its powered flight, arrived at the insertion point traveling at a precise speed, and completed its pitch-over to an earth-referenced horizontal path with the spacecraft's longitudinal axis in an exact attitude at the same moment it reached that orbital point.

The photo at the right shows the sequence of events during powered flight. At lift-off the inertial velocity was 1,340 feet per second; at booster engine cutoff 131 seconds later the altitude was 202,553 feet, the surface range 44 miles, and the velocity was 10,300 feet per second; 3 seconds later at booster jettison the altitude was 213,289 feet, the surface range 48 miles and the velocity 10,400 feet per second.

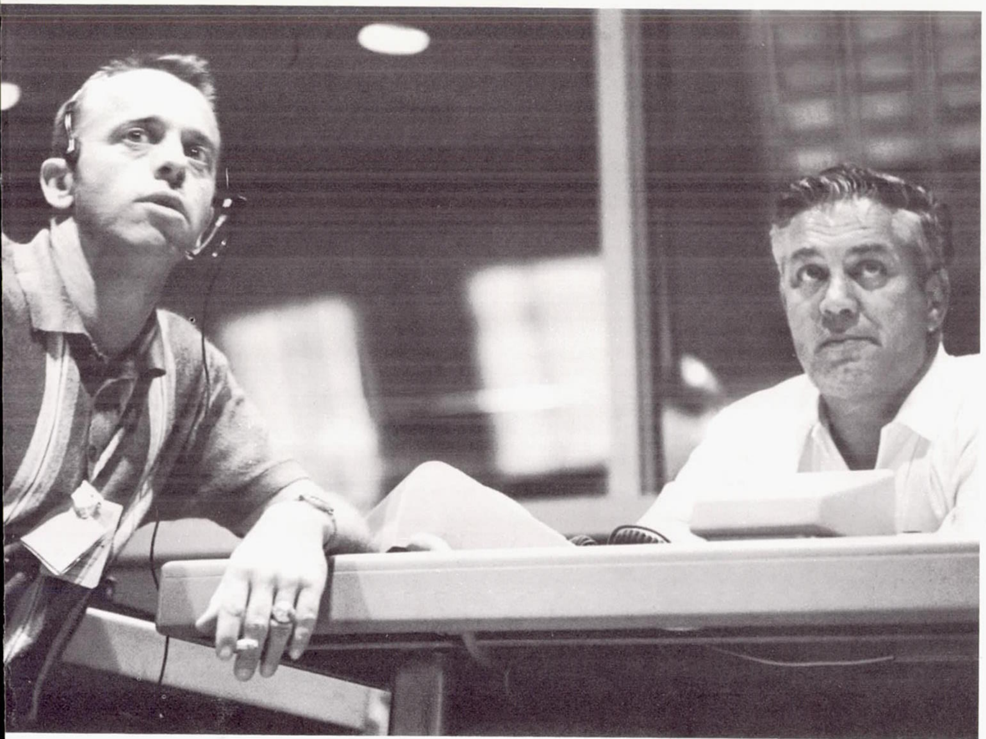
The escape tower was jettisoned 154 seconds after lift-off and at this time the altitude was 289,399 feet, the surface range was 76 miles and the velocity was 11,100 feet per second. The sustainer and vernier engine cutoff occurred at 305 seconds after lift-off at an altitude of 528,400 feet, a surface range of 437 miles and a velocity of 25,700 feet per second. One second later the spacecraft separation occurred at the same altitude, a surface range of 441 miles, and a velocity of 25,750 feet per second.

Cooper said at his post-flight press conference, "I felt as if I was right out on the point of a needle being put right to the target. I was. It was almost a perfect insertion."

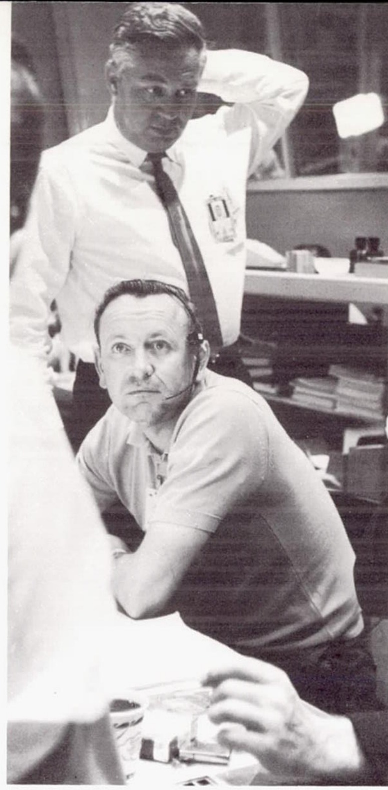


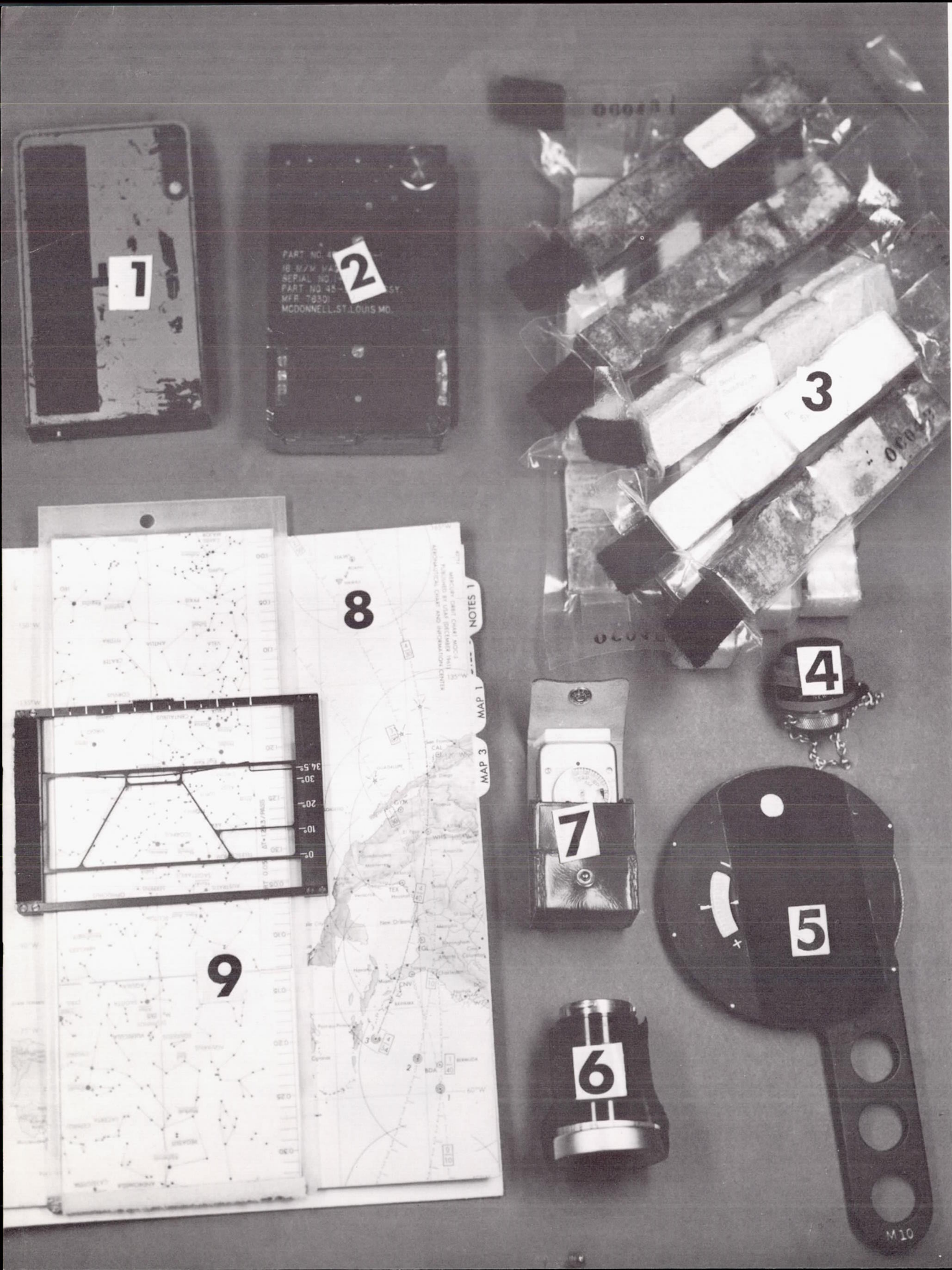


A scene in Mercury Control Center, with the "Faith 7" spacecraft shown on the world map just after passing the Zanzibar tracking station on its 16th orbit.



MERCURY CONTROL CENTER at Cape Canaveral is the focal point of the MA–9 mission, from which all decisions relative to the flight are made. At the left above, backup pilot Alan B. Shepard, Jr. (left), and Operations Director Walter C. Williams monitor the progress of the flight after liftoff. At upper right, Walter C. Williams (standing) and Christopher C. Kraft, Chief of Flight Operations Division, make the decision to go for the full 22 orbits. At lower left, Robert R. Gilruth, Director of MSC (left), D. Brainerd Holmes, Director of Manned Space Flight for NASA, and Walter C. Williams relax after recovery has been completed. At lower right, Astronaut Walter Schirra, Jr., capsule communicator for the mission, talks from Mercury Control to Trudy Cooper in Houston after recovery of the "Faith 7" and its pilot.





EXPERIMENTAL ASPECTS OF THE "FAITH 7" FLIGHT

The flight plans for Cooper's 22-orbit mission called for him to spend more than 22 hours (of the total 34 plus hours) in drifting flight, and to participate in 11 different experiments. Those experiments were concerned with aeromedical studies, a flashing beacon, dim light phenomena photographs, horizon definition photographs, radiation measurements, a tethered balloon, infra-red weather photographs, television system operation, cabin environmental temperature study, a high frequency antenna test, and ground light visibility.

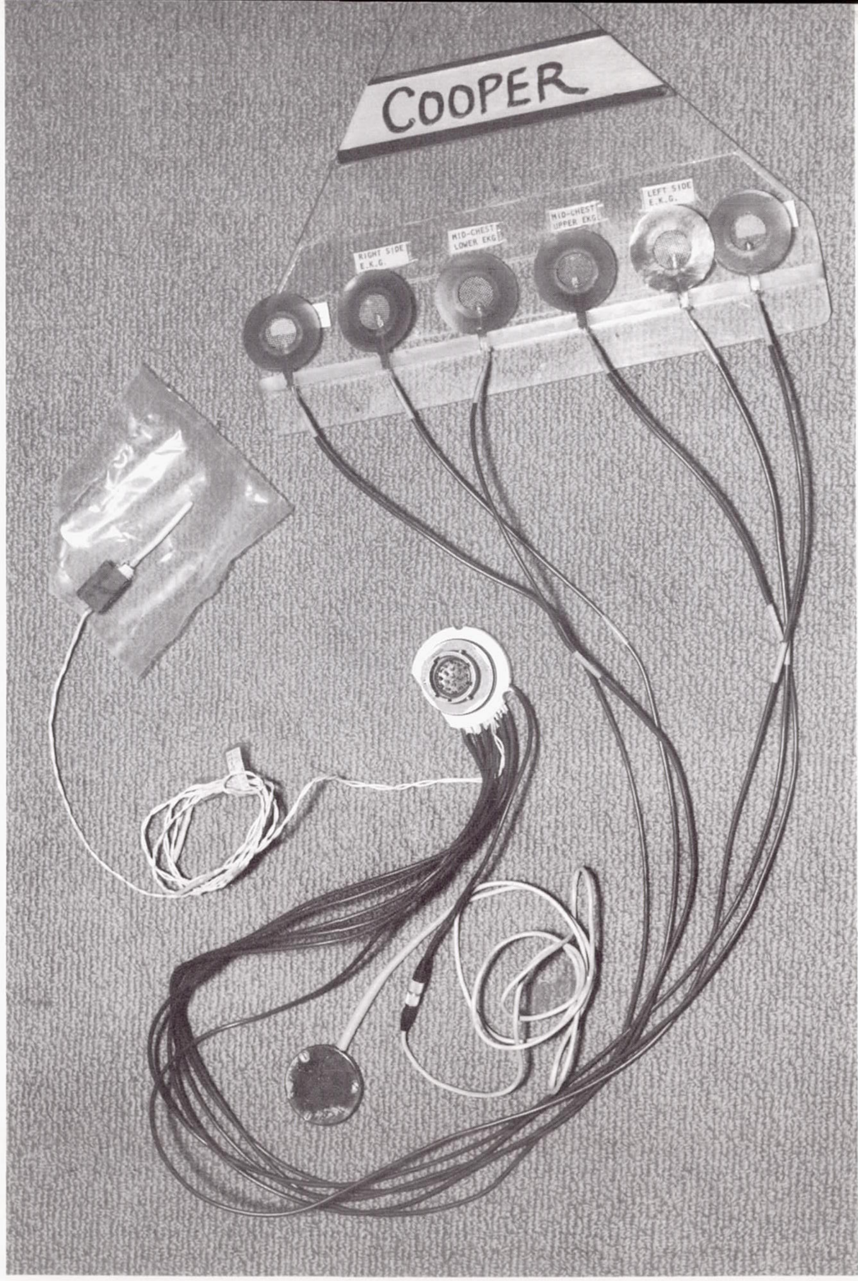
In addition, one experiment was conducted without astronaut participation. This was a white patch temperature experiment.

Drifting Flight

Drifting flight is one of the modes of control which has been developed to save electrical power and fuel and to permit the astronaut more time for other activities such as taking part in experiments, to obtain vitally needed photographs and to sleep. In this mode of flight, the pilot obtains the required spacecraft attitudes, then powers down.

In connection with the MA–9 flight, Cooper was programmed to spend periods varying from 5 minutes to a maximum of 13 hours and seven minutes in drifting flight, for a total of more than 22 hours . . . the longer period, of course, included the period set aside for him to rest. This meant, in effect, that he was in drifting flight more than two-and-a-half times longer than the complete time Astronaut Walter M. Shirra, Jr., was in space during his six-orbit mission October 3, 1962.

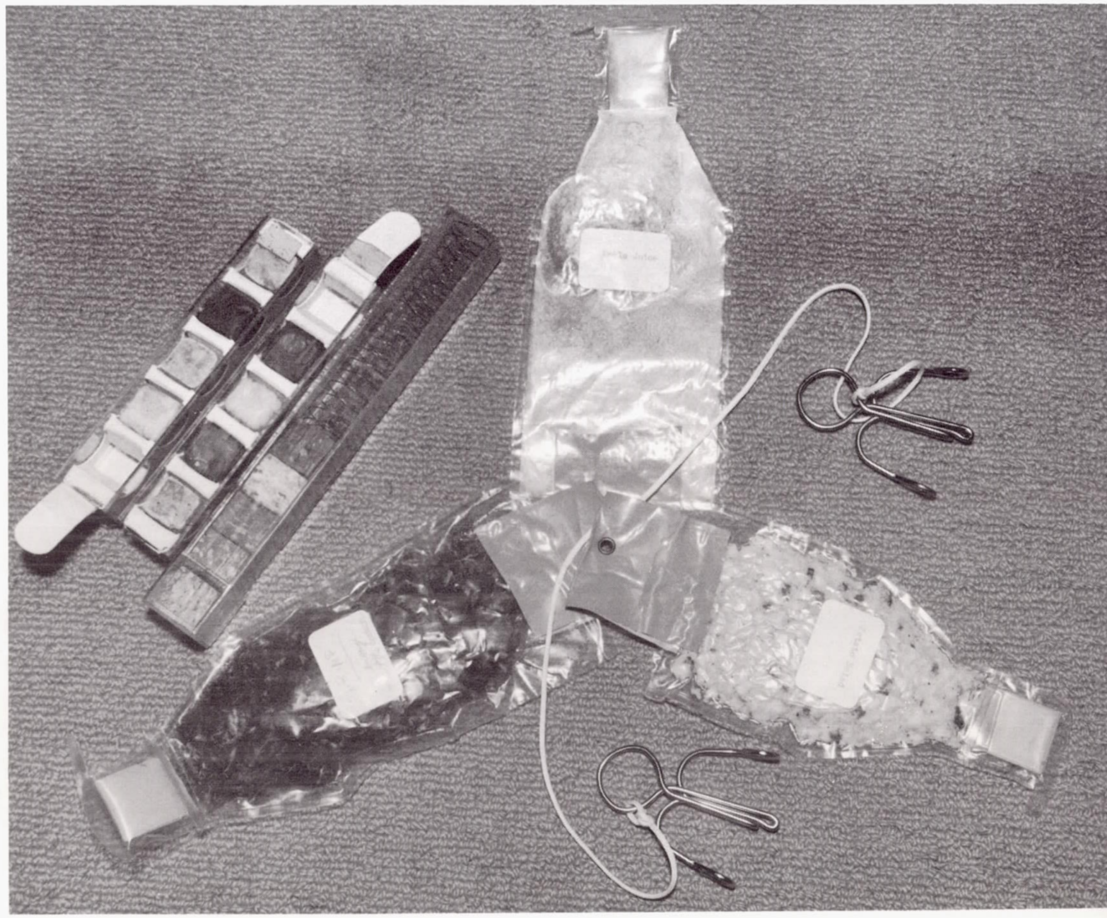
◀ When Gordon Cooper entered his "Faith 7" spacecraft, he found the following equipment aboard: (1) 16 mm camera magazine, (2) 16 mm camera magazine, (3) food, (4) standard light source, (5) extinction photo meter, (6) 50 mm lens for 16 mm camera, (7) exposure meter, (8) orbital navigation booklet, and (9) star navigation device.



AEROMEDICAL STUDIES

The objectives of the aeromedical studies made in connection with the MA–9 flight included an evaluation of man's cardiovascular (heart) system response to conditions associated with extended orbital flight to determine the adequacy of the spacecraft environment and life support systems. Also evaluated were rest, eating and drinking, to maintain the proper hydration, nutrition, and physiological reserves of energy required throughout the mission; and the performance of a calibrated exercise as a measured load on the system.

As a part of the cardiovascular response evaluation, an oral temperature measuring system, consisting of a thermometer imbedded in a latex probe, was stowed in the right earmuff of Cooper's helmet. This required him to open the visor to insert the probe under his tongue. In each of the five temperature tests



Pictured above are the bio-sensors which Astronaut Cooper wore attached to his body during the MA–9 flight to record his heart and respiration rates. The oral thermometer used to take his temperature is in the left center of the picture. At the right is the in-flight food carried, including dehydrated shrimp, potato salad and apple juice.

scheduled—during the 1st, 4th, 8th, 16th, and 21st orbits—he was required to hold the probe in a single position under his tongue for a 5-minute period.

Blood pressure readings were taken 20 times during the flight by means of a tailored cuff on the upper left arm.

The exerciser consisted of a two-hand grip anchored to the spacecraft structure. It had a stretchable bungee cord and non-stretching line to limit the length of the travel. Pulling the hand grip to its fullest extension imposed a calibrated work load on Cooper. These exercises were performed during the 2d and 5th orbits, and in each case blood pressure was recorded before and after the exercise.

Food for the mission was of two types—ready-to-eat bite-size food in sufficient quantity to satisfy all caloric requirements, and experimental dehydrated food and drink pre-packed in plastic containers for reconstitution during flight. Preparation of the dehydrated food required the addition of water to fill the containers carefully in order to avoid spillage under zero gravity during the transfer operation. The rehydrated drink was ready for consumption shortly after the water was added; while rehydrated food required about 5 minutes mixing to blend with water.

Cooper said he ate 4 brownies and took 6 gulps of water after 4 hours and 54 minutes; ate and drank after 6 hours and 15 minutes of flight, and again after 11 hours. Some 26 hours and 15 minutes after lift-off he ate some fruit cake and took 5 or 6 gulps of water, and had other light snacks at 28 hours and 30 minutes of flight and 28 hours and 59 minutes. When asked at the post-flight press conference at Cape Canaveral whether the food supply was adequate or whether he felt hunger pangs at any time, he replied, "I really had to force myself to eat—I never did feel too overly hungry. I think the food I had along was adequate, although it was so much work to get to some of it here, that I tended to just perhaps not eat as much as I should have. These are the little food cubes we had along. I ate one whole box of these, plus several other items. These are quite good but they are more of a dessert type and you fairly rapidly get tired of dessert."

FLASHING BEACON EXPERIMENT

The primary objective of the flashing beacon experiment was to determine the capability of Cooper to see a light of known intensity at distances up to 15 miles from his "Faith 7" spacecraft. The ultimate purpose of this test was to secure data on visual aids for use in Projects Gemini and Apollo—aids which might prove valuable in the rendezvous techniques being developed for those programs.

The night phases of the 3d, 4th, and 5th orbits were to be utilized for this experiment, in which two xenon lights flashed on for approximately 100 microseconds out of each second (one ten-thousandth of each second). The lights radiated omnidirectionally and were about the same magnitude as the star, Polaris, at a distance of 6 to 8 nautical miles.

Prior to deployment, the sphere, which was 5¾ inches in diameter and weighed 10 pounds, was contained in a cylindrical canister attached to the retropack, and was ejected downward by a compressed spring and piston assembly.

Following ejection the sphere was located in a region ahead of the spacecraft's flight path and varied in a relative pitch angle of 65 degrees during the night observation periods. Cooper marked on tape the instant he saw the light. Referring to the ejection, Cooper said at the conference, "At 3 hours and 25 minutes, I went back to fly-by-wire off the automatic system, pulled up a minus 20 degrees by the tick mark on my window, armed my system and deployed for the first time from the satellite another satellite."

He was unable to see the light during the night phase of either the 3d or 4th orbits, but said, "At 5 hours and 20 minutes, I observed this light coming up from below me on the ground, the earth was dark in the background, I could see the horizon with the hazel air above it, and the stars, and I observed this light that I thought someone was launching something out in front of me. . . . I didn't think they'd do that, but it persisted in coming up in relation to where I was, it was down below me against the earth and gradually rose up and as I watched it I finally saw that little rascal strobing (emitting light flashes) and it was the flashing beacon, so I yawed off from it—then after I identified it positively and observed it for a moment and to see if I could pick up again after having been away from it in yaw for a while." Cooper also reported that he saw it during the next two night phases.

William Carmines, left, of Langley Research Center and William Armstrong of Manned Spacecraft Center discuss the flashing beacon experiment before the MA–9 flight. The beacon is at the left, and the canister, from which it was launched, at the right.

Dim Light Phenomena Photography

The purpose of this experiment was to gather photographic data of two dim light phenomena—zodiacal light, a faint, hazy, conical light that can be seen just after sundown or sunup and the night airglow layer, a three-color luminescent layer that can be seen at night in the high atmosphere.

It is hoped that as a result of Cooper's completion of this experiment that photographs of the zodiacal light may help to determine its exact origin, geometric distribution, and its usefulness in studying solar radiation and flare activity.

Data on the airglow layer is expected to provide information on the solar energy conversion processes occurring in the upper atmosphere.

During the 16th orbit Cooper obtained time exposures on colored film to ascertain whether zodiacal light is a continuing phenomenon or if it arises from two distinct processes. The equipment consisted of a 35 mm camera with a special lens system provided by the University of Minnesota, which proposed this study.

Just after sunset on this orbit, he began the first of four sequences of zodiacal light photographs, lasting 1, 3, 10, and 30 seconds each. Cooper made five exposures of each sequence, with intervals of 15 seconds between exposures in the first three instances and 30 seconds between the 30-second exposures.

Horizon Definition Experiment

Following the dim light photography stint, Cooper completed the horizon definition experiment which was designed to determine whether the earth's horizon and atmosphere can be used as a reliable reference during the midcourse phase of translunar missions. The results obtained will be used by the Massachusetts Institute of Technology in the development of guidance and navigation systems for Project Apollo.

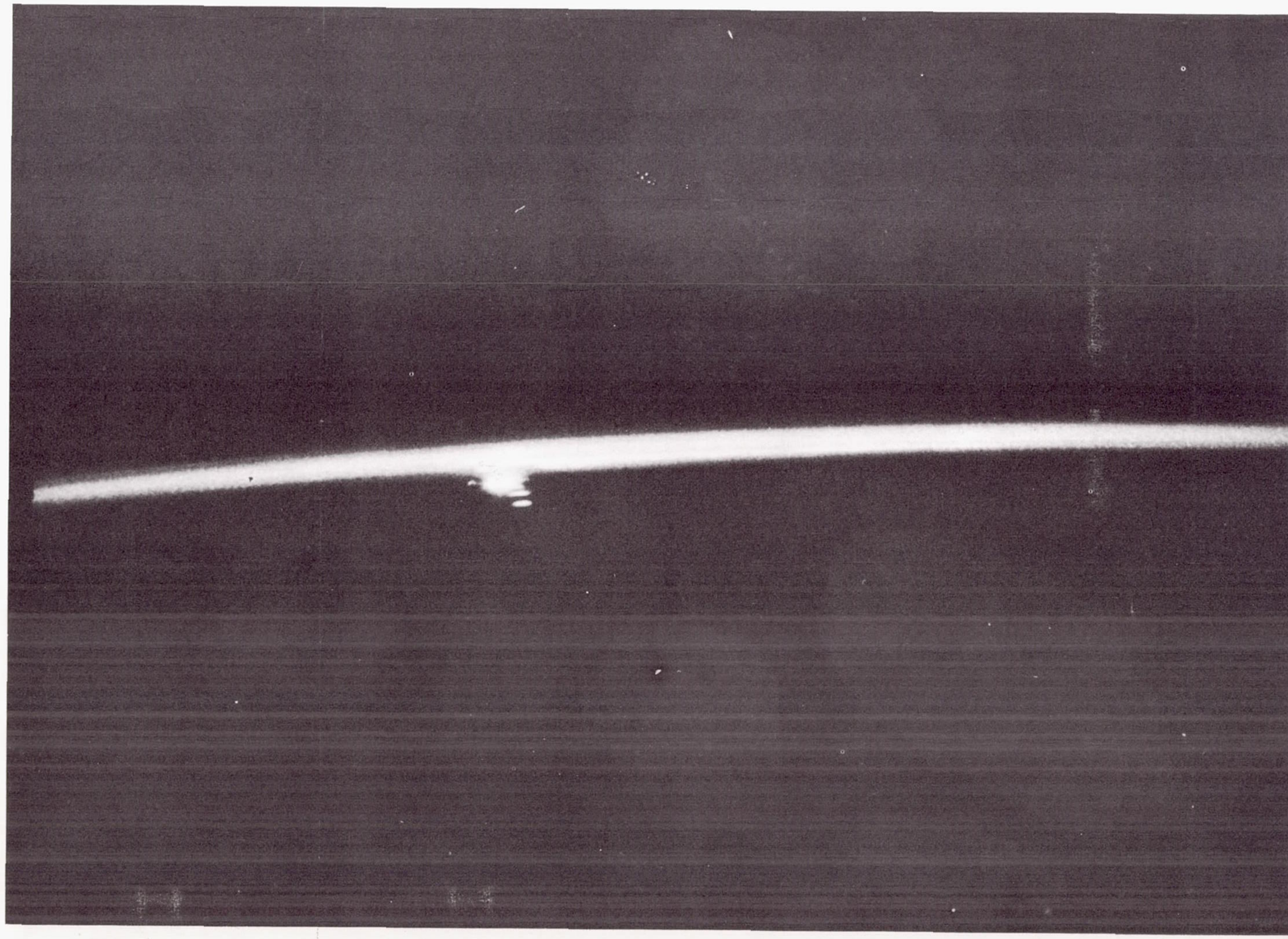
Cooper used a 70 mm Hasselblad camera and a magazine containing red and blue filter strips mounted ahead of the film plane to take a sequence of photographs including the moon and horizon together.

Other photographs of the horizon were secured on previous Project Mercury flights. See picture at right.

Radiation Measurements

The principal objective of this study was to measure radiation at spacecraft altitudes. Specifically, the experiment was designed to provide a survey of fission electrons trapped in the lower regions of the earth's magnetic field approaching closest to the earth's surface over eastern South America and the South Atlantic. It was anticipated that the test would provide additional data on decay of the artificial radiation belt created by high altitude nuclear detonations. During the periods of the flight when the higher count rates were expected, Cooper switched on the on-board tape recorder to continuous in order that certain data might be recorded.

These periods, in which he voice-recorded his most accurate estimates of the spacecraft attitudes and name-recognizable stars and landmarks, with reference to their relative positions in the window, occurred during the 4th, 5th, 6th, 7th, 8th, 16th, 18th, 19th, 20th, and 21st orbits.



A view of the horizon photographed by Astronaut M. Scott Carpenter during the Mercury-Atlas 7 flight.

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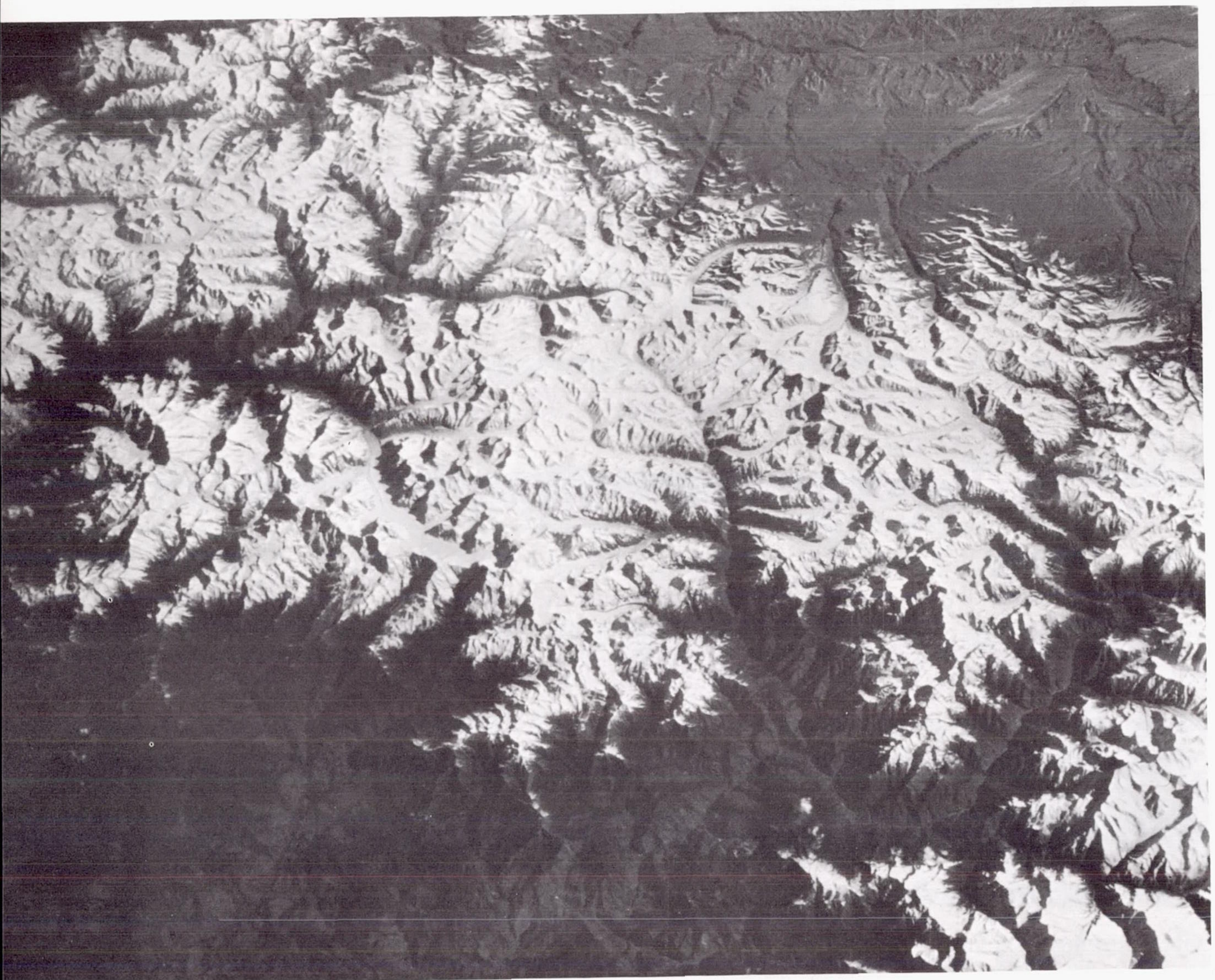
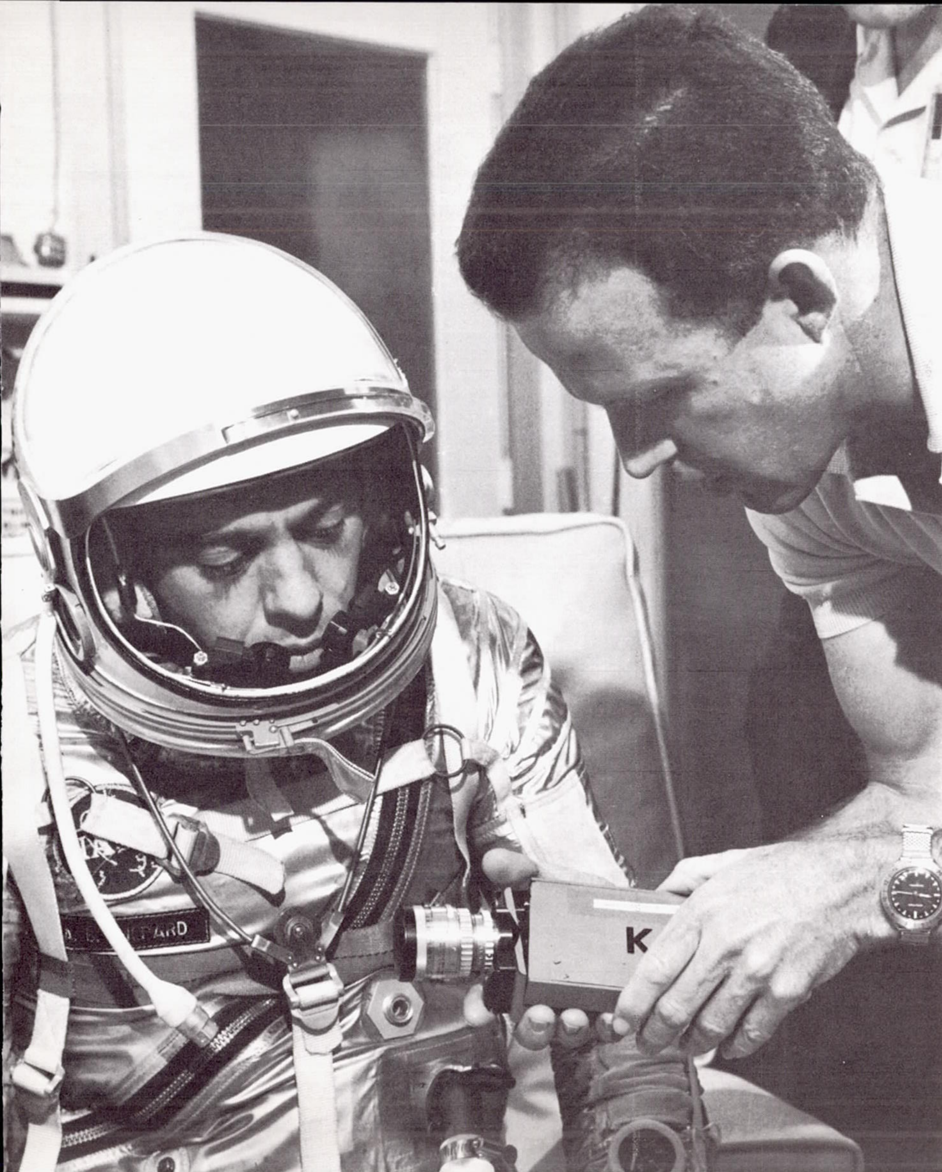
Infra-Red Weather Photography

In this test, Cooper used infra-red film and filters to study weather phenomena from orbit for the U.S. Weather Bureau. The ultimate objective was to obtain basic information on infra-red reflectance (capacity to reflect) from the earth's atmosphere and design data for instrumentation going into future meteorological satellites.

For this purpose, he used a Hasselblad camera with 70 mm film and an 80 mm lens. Cooper completed this experiment at the end of the 17th orbit and start of the 18th orbit. He attempted to get both oblique and nearly vertical views of coastlines and partially cloud-covered areas. He reported to the news media conference that after 26 hours and 40 minutes of flight, "I took some interesting cloud arrangement pictures and coastline cloud arrangements for the Weather Bureau."

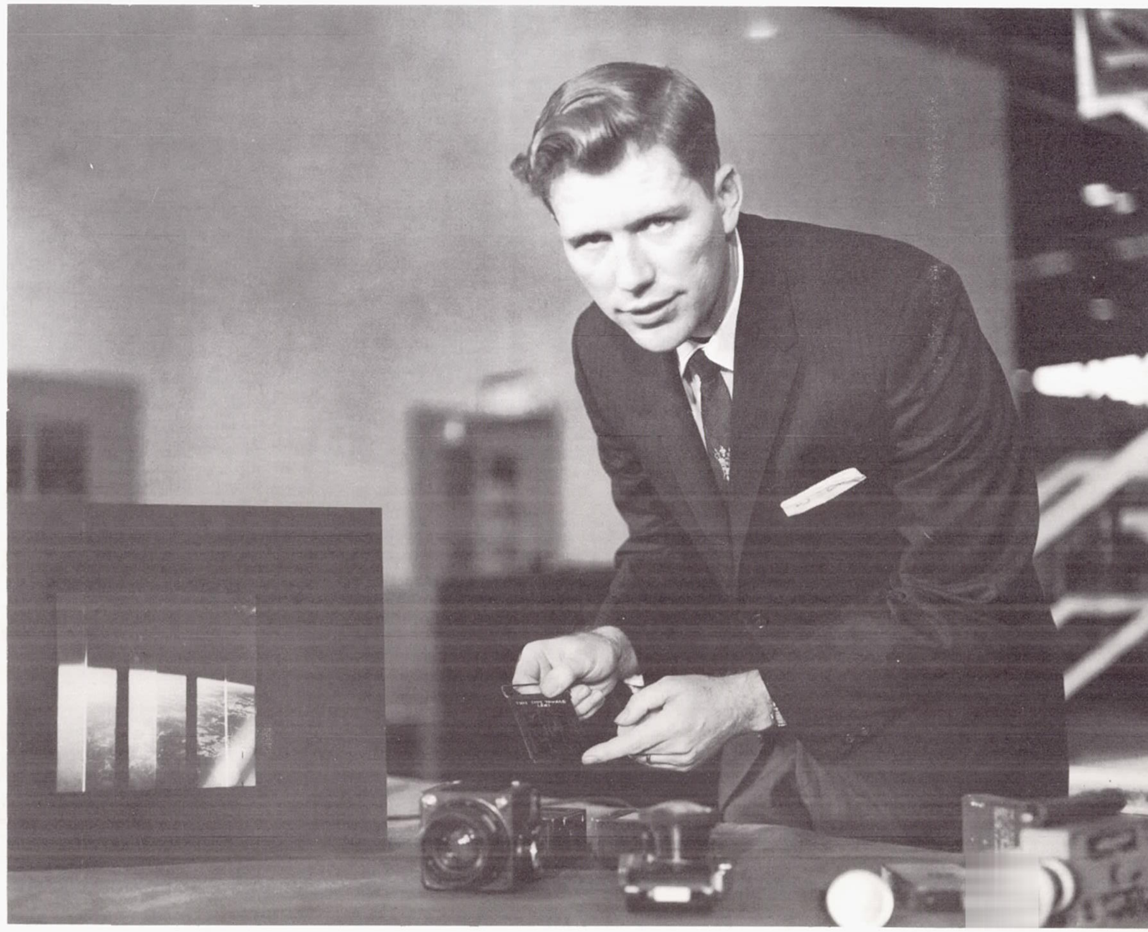


◀The Himalayan Mountains as viewed and photographed by Cooper from within the "Faith 7."



Cooper discusses the hand-held 16 mm camera to be used during the flight with backup pilot Alan B. Shepard, Jr.

Special photography equipment aboard the "Faith 7" spacecraft is displayed here by Roy Stokes of Manned Spacecraft Center. The equipment, used in the experimental phases of the mission, consisted of the Hasselblad camera, a Royal Robot 35 mm camera, and a 16 mm camera.



The MA–9 pilot gets in some practice with the television camera to be used during the mission to focus on the pilot, and which can be hand-held and focused on other objects to pick up the view outside the spacecraft.

William Humphrey of Manned Spacecraft Center holds the MA–9 on-board television camera, while on the table in front of him is the television monitor and ground support equipment for the system, which was received in Mercury Control Center, the Pacific Command Ship, and Canary Island tracking stations.

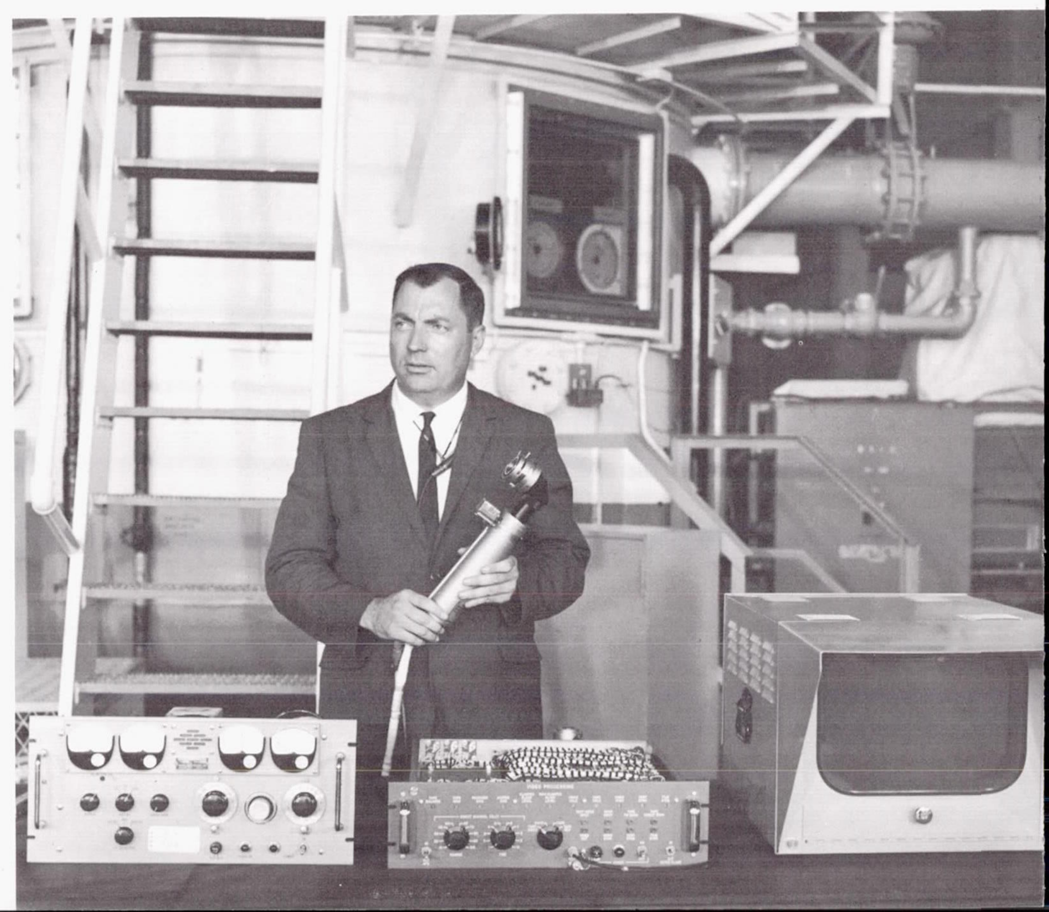
TV SYSTEM OPERATION

A special television camera was carried on the MA–9 flight to evaluate its operational value for monitoring the pilot's well-being, obtaining backup readings of the instrument panel indications, and for observing tests, experiments or external phenomena through the spacecraft window.

The camera weighed 10 pounds and was scheduled to use 56 watts during operation. An additional 7 pounds was required for cabling, bracket and ballast. During the flight it was programmed to be in operation an hour and 58 minutes. The television camera data could only be received when the spacecraft was within telemetry contact with a ground station properly equipped to decode the television specifically. Only three ground stations had this capability—Mercury Control Center, Canary Island, and the Pacific Command Ship. A special telemetry transmitter was added to the spacecraft to transmit the television output directly to those sations.

At Mercury Control Center the flight surgeon had access to a real-time monitor modified to use the 2-second scan speed. Five other television monitors also carried the picture at the standard scan rate after electronic conversion of the telemetered image. The camera was used in a bracket to show the activities of Cooper, and was hand-held by him to record targets of interest during television contact times.

The transmissions were of value to the medical monitors, and were relayed to the public via commercial television.



Cabin Environmental Temperature Study

The purpose of this test was to obtain information on the temperature balance within the spacecraft cabin and on heat losses into free space without the cabin coolant system in operation. It was predicted that the maximum stable temperature reached without coolant would be within the tolerable limits of the cabin equipment and the man, using suit coolant only. The results are expected to provide engineering data for future heat exchanger systems.

This experiment required no equipment other than the usual spacecraft systems and was started during the fifth orbit of the "Faith 7" spacecraft.

Prior to the start of the test, Cooper recorded the cabin air temperature, cabin and suit heat exchanger dome temperatures, suit temperature and the coolant valve settings for both the cabin and suit.

He then switched the cabin fan off and closed the cabin temperature control. At several minute intervals he recorded time and all previously mentioned temperatures and coolant valve settings until the temperatures stabilized to insure that no failures would be imminent from overheating equipment.

If, at any time during the test, the cabin, suit or equipment temperatures had reached critical limits Cooper would have returned the cabin fan switch to normal and opened the cabin temperature control to an appropriate setting.

Speaking of this test, Cooper said, "At the end of 6 hours and 15 minutes I turned off the cabin fan, turned off the cabin cooling and started the experiment on the cabin to see if we actually need to utilize this coolant quantity throughout the flight when you're powered down. I might add that we did not. The temperatures remained at a very reasonable range in the cockpit and we left the coolant flow and cabin fan off until just prior to reentry and we powered up, cooling it down very slightly."

High Frequency Antenna Test

This experiment will provide measurements of antenna polarization and atmospheric effects associated with high frequency communications between an orbiting spacecraft and ground stations. The results will be directly applicable to the vertically polarized high frequency antenna to be used on the Project Gemini spacecraft.

This test required two high frequency transmissions—one after 29 hours and 53 minutes of flight, just north of Panama so the spacecraft would be fairly close to receiving stations where reasonable reception and good coverage of the region just beyond the line-of-sight were expected; and the second after 30 hours and 8 minutes of flight, over the South Atlantic in a remote area where long ranges well beyond line-of-sight are required for station contact.

In both cases, the tests were conducted with the 28-foot dipole antenna in a horizontal position, and, again in a vertical position with the dipole pointing toward the center of the earth.

About 5 minutes were required to make a call in one position, then the spacecraft was rolled 90 degrees and the transmission was made in the other position. During the test periods all ground stations recorded output in order that a comparison of recorded signal strengths might be made after the flight.

Ground Light Experiment

The ground light experiment was designed to provide data on approximately the minimum intensity for a point-source ground light visible from spacecraft altitudes. The information will be used to indicate the feasibility of using ground or higher altitude lights as navigation fixes for mid-course and near-earth corrections in Project Apollo.

A high intensity xenon light was located at Bloemfontein in the Union of South Africa. The three million candlepower light was illuminated continuously for three minutes while the "Faith 7" was within range on its 6th orbit.

The experiment was also scheduled to be made during the 21st orbit if Cooper had been unable to see the light during the earlier try. Previous attempts to sight ground flares or test lights on other Mercury missions had failed because of cloud cover over the test areas.

It was anticipated that at this new location, away from coastal regions and at 4,680 feet elevation, this problem would be overcome.

Cooper said of this experiment: ". . . 8 hours and 21½ minutes. I pitched down to observe the ground light that we had operating. . . . I saw it and I saw the town it was in. I was fortunate that a large portion of the world was clear, so I could observe a lot of these things on the ground."

White Paint Patch Study

The skin temperature test on MA–9 was included to investigate changes in white paint pigments during reentry heating.

The test of the three types of white coatings on the outer surface will provide information on changes of pigment reflectivity. The three test panels were 6-inch squares baked onto a single test shingle located at the small end of the conical section. Theoretical calculations indicate that as much as 10 to 15 degrees Fahrenheit lower cabin temperature might be possible for a spacecraft protected with a low absorptivity coating instead of the present dark colored coating.

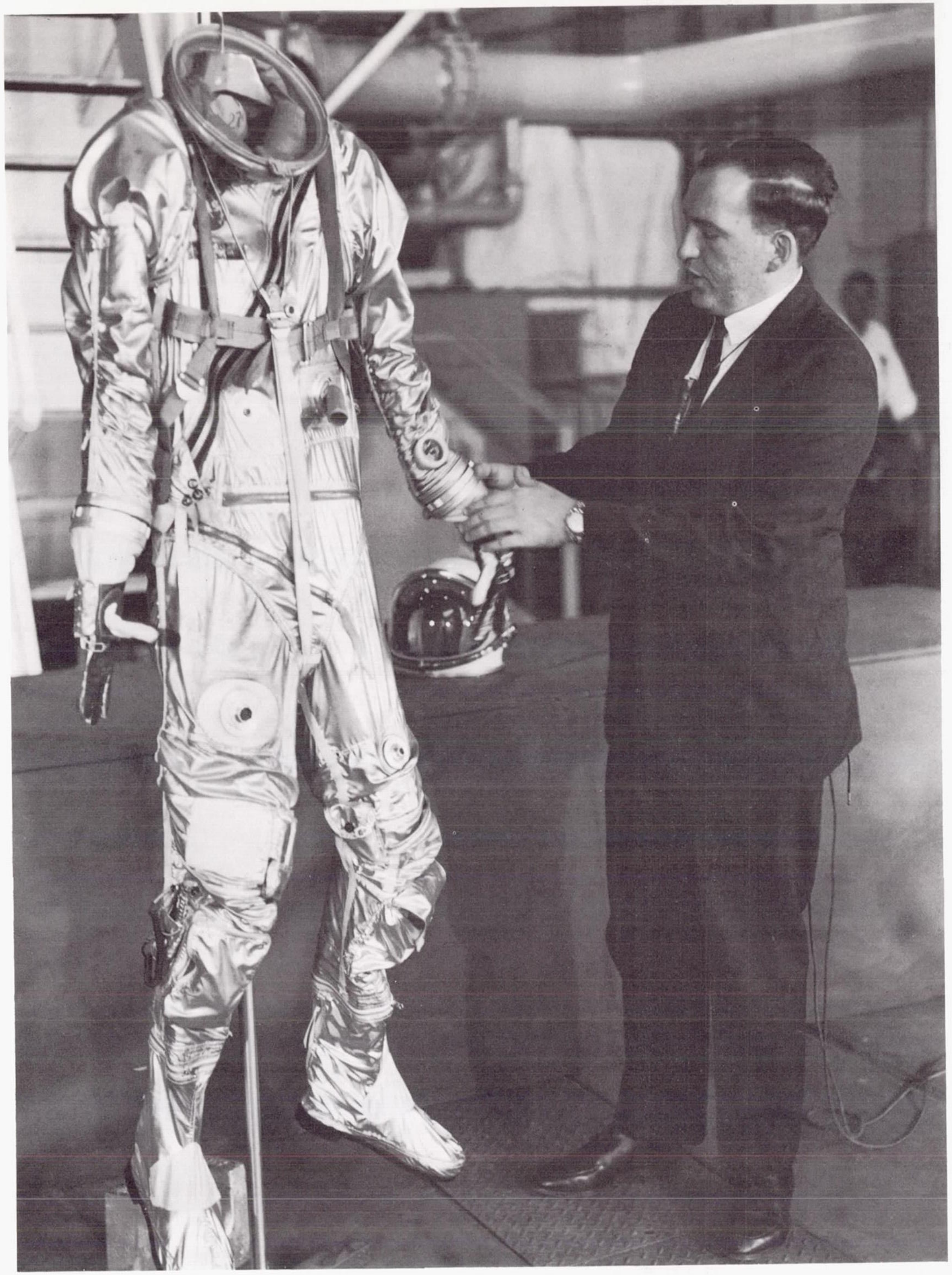
A report to Manned Spacecraft Center by the McDonnell Aircraft Corporation (prime contractors for the Mercury spacecraft) in January 1963 related to the study conducted during the Mercury-Atlas 7 and Mercury-Atlas 8 flights to ascertain temperature effect on those spacecraft as a result of a white paint patch experiment.

On both of those flights a 6-inch square white patch was painted in order that a comparison might be made with temperatures of the dark colored oxidized coating. The basic objective was to obtain a differential temperature measurement between two surfaces which were about 6 inches apart.

Differences in the spacecraft shingles prevented the test from being completely conclusive, however, the recorded temperatures during the flight were sufficiently different to determine that the spacecraft was cooler at points directly beneath the patch.

According to the McDonnell analytical calculations, white painted spacecraft will be advantageous for long duration missions.

The Mercury-Atlas 9 mission's white paint patch study was conducted in order to obtain further information to verify these calculations.

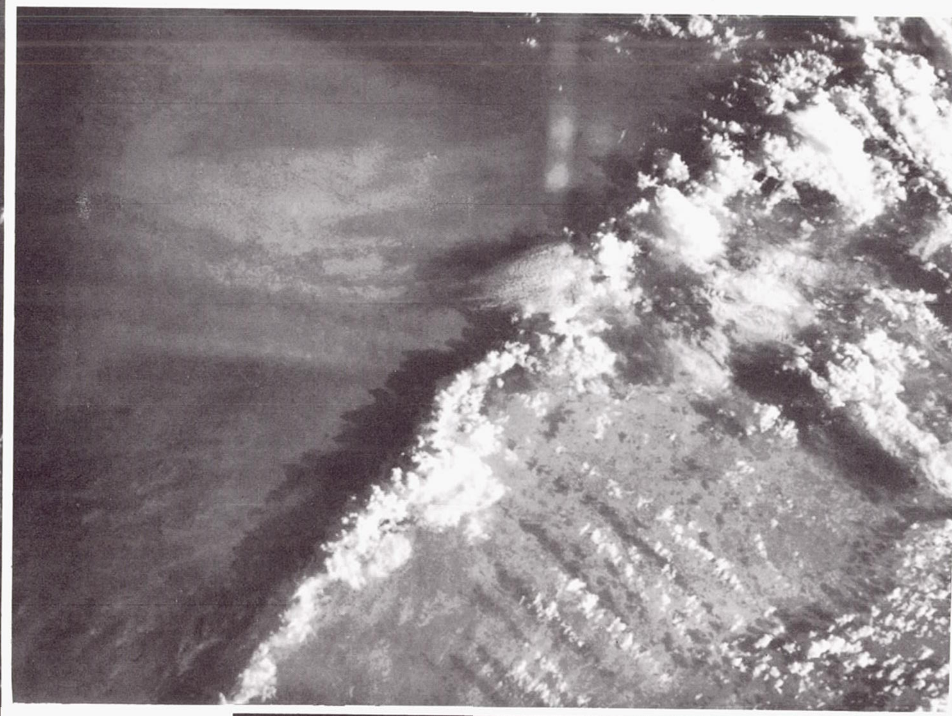


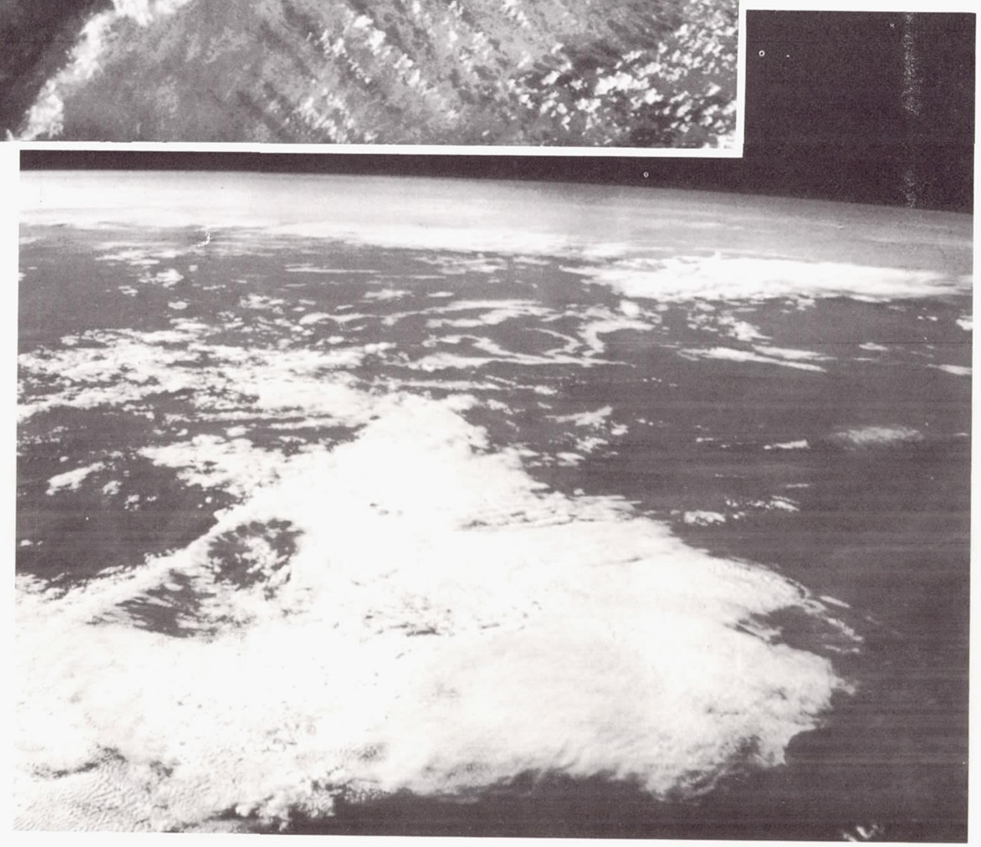
SUIT CHANGES

For Cooper on his MA–9 flight a number of changes were made to the astronaut's suit as compared to suits worn on previous flights. The major changes and their purposes:

- The boots were integrated with the suit to provide additional comfort for the longer mission, to reduce weight of the boots, and to provide easier and shorter donning time. They were integrated by extending the present outer suit material down to the soles. A zipper was provided vertically from the rear of the sole upward to allow foot insertion.
- The shoulders had new construction. Utilizing the same materials, they provided increased comfort and pressurized mobility.
- The wrist section of the gloves was changed with new construction and material called "hind-net" for increased mobility, and to eliminate wrist adjustment straps used on previous flights.
- The locking mechanism which holds the gloves to the suit torso was changed to incorporate an additional locking "dog." In preflight training it was discovered that the glove as then designed could possibly be disconnected.
- The life vest location was changed from center front of the chest to a pocket on the lower left leg, eliminating bulk from the front of the suit and to provide additional comfort.
- The Environmental Control System vent inlet fitting on the front of the suit torso was changed to a type which has a "built-in" automatic water seal when the hose nozzle is disconnected rather than the manual seal used on previous flights. This requires one less motion on the part of the astronaut in the event of emergency egress from the spacecraft in water.
- Provision was made for a thermometer on the right ear cup of the helmet.
- New microphones for increased performance were installed in the helmet.
- A change was made from a pneumatic type visor sealing mechanism to a mechanical type. This provided increased flight safety and reliability for the pilot.

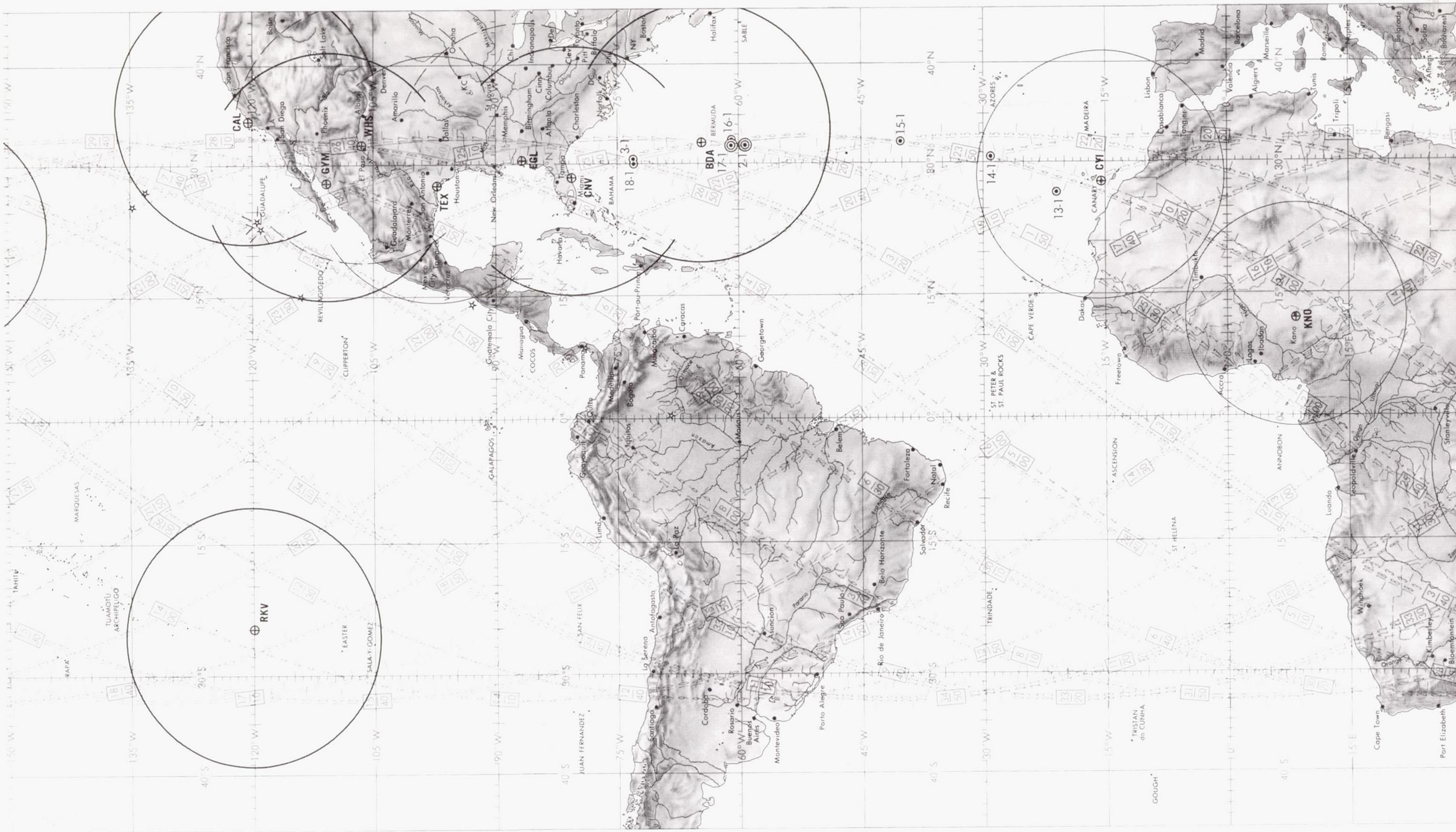
◀ **James McBarron, Manned Spacecraft Center, describes the space suit worn by Astronaut L. Gordon Cooper, Jr., during the MA–9 flight.**





Above, an oblique photograph of a Pacific Island taken by Cooper from inside the "Faith 7" with a 70 mm Hasselblad camera. At upper right is a view of the Arabian Desert and at right is a cloud formation over the Atlantic Ocean.

ORBITAL CHART OF



MERCURY ORBIT CHART MOC-6
1st EDITION-FEBRUARY 1963
PUBLISHED BY THE USAF
AERONAUTICAL CHART AND INFORMATION CENTER

1. **Orbits are numbered by the figures that form the lines of the orbital paths.**

2. **Hours and minutes of flight time, indicated in rectangular boxes, give the approximate location of the spacecraft at such times.**

THE MA-9 FLIGHT

Command Site (coverage limits)

Mission Control Site (coverage limits)

Site with Radar only (coverage limits)

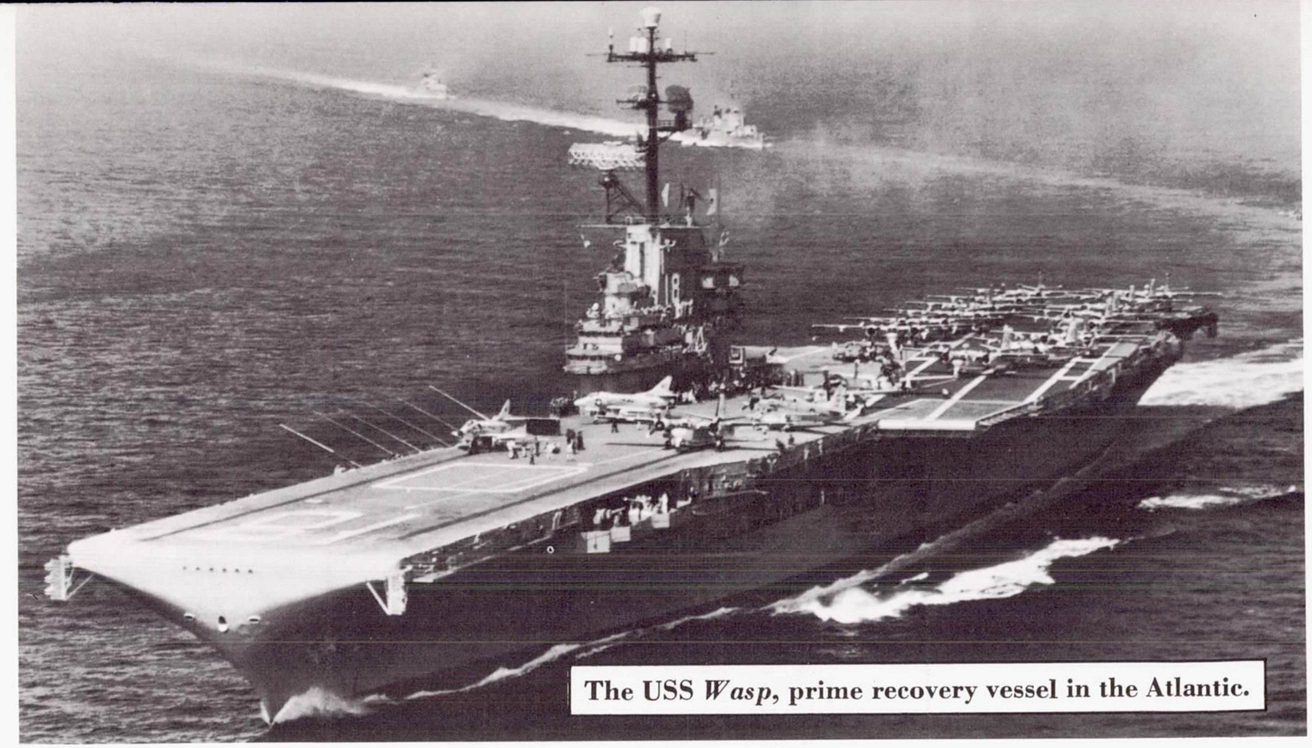
Primary Retro-sequence Initiation Points

Planned Retro-sequence Initiation Points

Primary (Go-No Go) Landing Areas

Planned Landing Areas

Scale at Equator 1:52,000,000



The USS *Wasp*, prime recovery vessel in the Atlantic.

RECOVERY FORCES WERE SPREAD WORLD WIDE . . .

As Gordon Cooper traveled through space, a net of recovery forces was spread around the world, ready and waiting for him. The recovery depended upon an integrated team of men and equipment from the Army, Navy, and Air Force. The men had special training and experience applicable to this task in which the probabilities were few but the possibilities almost unlimited.

Drawing upon its global resources, the Department of Defense assigned 28 ships and 172 aircraft and more than 19,000 people in direct operational support of the MA–9 mission. Despite the longer duration of the mission, the level of supporting forces was only slightly greater than that for MA–8. Experience gained by the supporting forces in previous Mercury missions and the expressed satisfaction by NASA of overall Department of Defense support made this level of support acceptable.

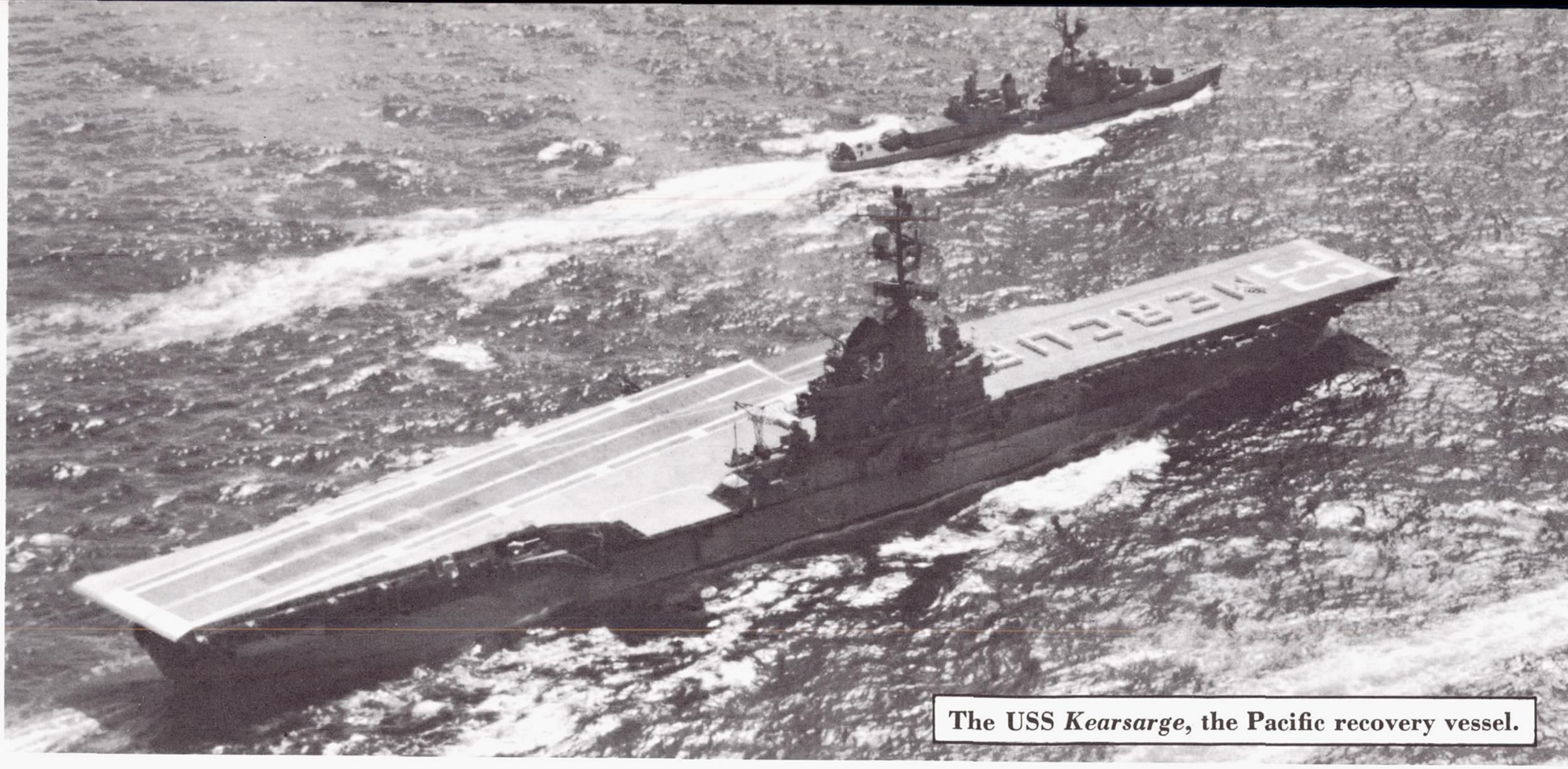
The planned recovery of Cooper and his spacecraft was similar to the successful operations conducted for previous orbital flights but on a broader basis. At the Cape Canaveral launch site there were two fire-fighting halftracks, three amphibious Army LARC's four Marine helicopters, and three small boats. In the event of launch site abort the astronaut would have been quickly retrieved by the launch site recovery team and taken to the Forward Medical Station.

In the Atlantic, Task Force 140 commanded by Rear Admiral Harold G. Bowen was ready to execute planned recovery operations with the aircraft carrier WASP, 10 destroyers, 2 minesweepers, 1 oiler and 1 salvage ship. Task Force 140 was divided into four groups: the Cape Canaveral Area Recovery group with 3 destroyers and 8 aircraft; the Bermuda Area Recovery Group had the carrier Wasp, 4 destroyers and 12 search and rescue aircraft; the Azores Area Recovery Group in the Eastern Atlantic consisted of an oiler, 2 destroyers and 10 aircraft; and the Canary Island Area Recovery Group had a destroyer and 4 aircraft. Two minesweepers and the salvage ship were stationed in shallow water 12 miles off Cape Canaveral.

If there had been trouble during the powered phase of flight, Cooper and his spacecraft would have been brought down in one of six planned recovery areas between Cape Canaveral and the Canary Islands.

Once orbit was achieved there were 21 planned recovery areas, eight in the Atlantic and 13 in the Pacific, each of which contained one or two ships. Selection of adjacent landing areas for various orbits enabled some ships to be on station in as many as four planned landing areas. In the Atlantic, for example, after the four recovery groups covered the launch phase of flight, their forces were redeployed to landing areas for other orbits.

In the Pacific, Task Force 130 was commanded by Rear Admiral Charles A. Buchanan. Planned recovery forces consisted of the Carrier Kearsarge, 10 destroyers, and some 20 aircraft. The Western Pacific Recovery Group was made up of 4 destroyers and 6 search and rescue aircraft. This group covered an area south of Japan in the Western Pacific. Units of the mid-Pacific Recovery Group covered the 10 areas around Midway Island, including the primary landing area 70


The USS *Kearsarge*, the Pacific recovery vessel.

miles southeast of the island. The Kearsarge, 6 destroyers and 14 aircraft were on station there.

Although past missions have had excellent results, with normal or near normal flight and landings within planned areas, there was always the possibility that an emergency might arise which would lead to a contingency landing. A large part of the Department of Defense effort and commitment of forces was for contingency operations.

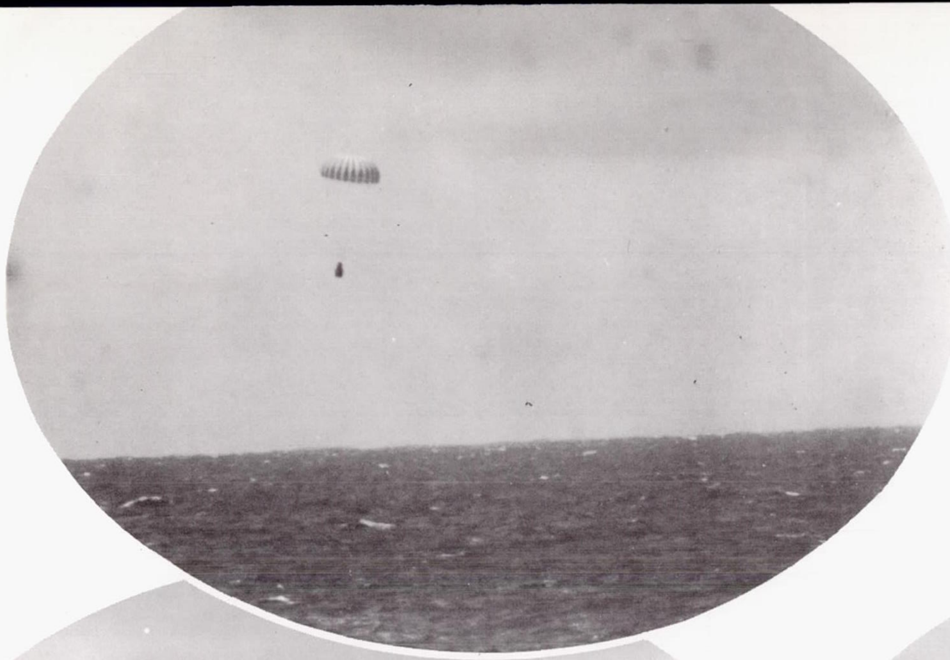
NASA requires that the astronaut be located within 18 hours if he lands anywhere along the 600,000 miles of orbital ground track. To accomplish this the Department of Defense strategically positioned 28 staging bases around the world. Nearly 100 search and rescue aircraft, equipped to "home-in" on the capsule's beacon from as far out as 60 miles were ready to take off and locate the downed spacecraft on land or sea. Thirty-three teams of military pararescue men—trained as precision parachutists, SCUBA divers, survival experts, and medical technicians—were ready to give the astronaut on-scene assistance. Seven Rescue Coordination Centers could direct contingency recovery operations in their sector of the world and maintain contact with Mercury Control.

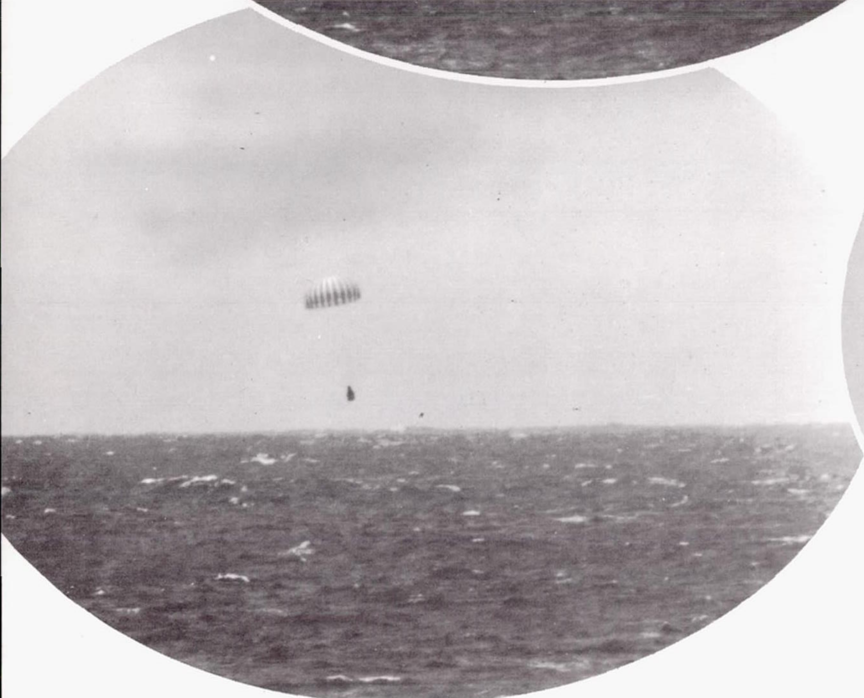
Contingency support came from many theaters and all branches of the service, but Air Rescue Service supplied the bulk of men and equipment. Because its training and experience is especially suited for contingency recovery operation, ARS had some 40 aircraft and 67 pararescue men deployed worldwide. For the first portion of the contingency mission, that of location of the spacecraft anywhere along the orbital ground track, the long range of Military Air Transport Service C–130E's was relied upon to cover vast stretches of open ocean. In Africa, USAF in Europe C–130's were ready on the runways with Army H13 helicopters inside. Some 2,800 landing strips were located in Africa on which these big cargo aircraft could land to dispatch their helicopters to yet more remote regions.

In the capital of each South American country, two C–47 aircraft were on alert for use during the mission. One airborne battalion from the Canal Zone was ready to drop by C–130 into the jungle should such a landing be made. Though not a part of the recovery team, these and other such resources were available for the remote possibility of an extreme emergency. Should it have become necessary, the Department of Defense representative for Project Mercury could have called upon any military or civilian ship or aircraft for assistance under the Search and Rescue Plan.

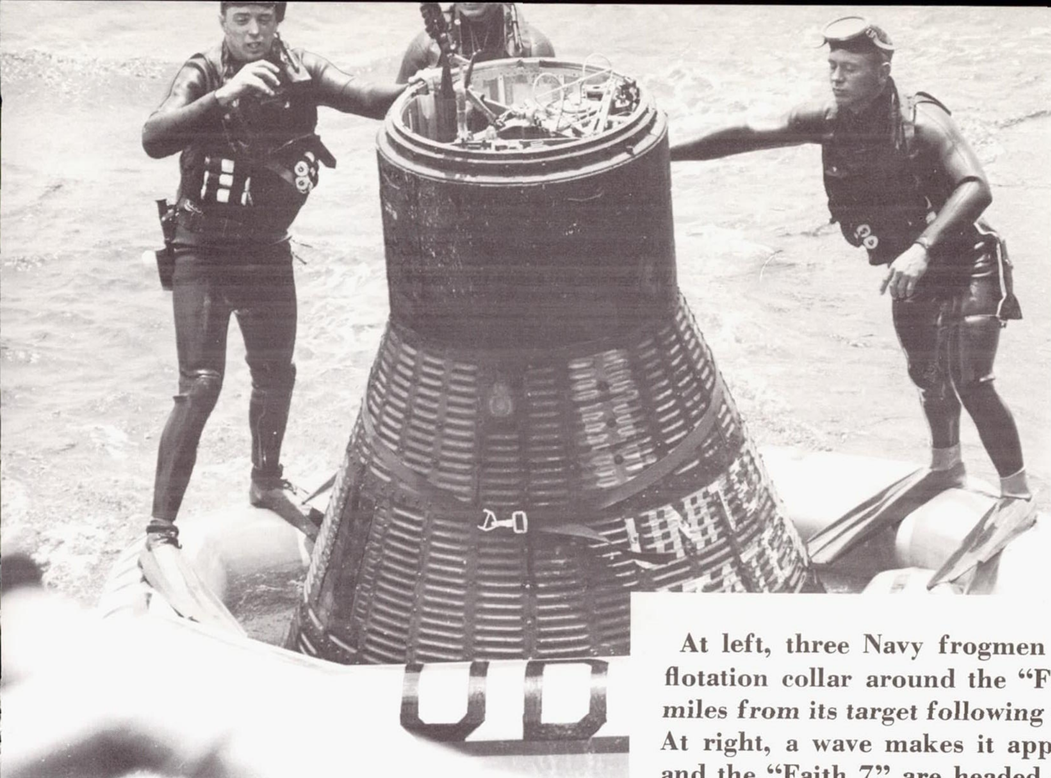
While search and rescue aircraft were prepared to locate and lend assistance to the astronaut in a matter of hours after a forced landing, actual recovery could take days. In the North Atlantic, a ship could have arrived on scene within a day. For the South Atlantic and Indian Oceans, 5 days was the estimate.

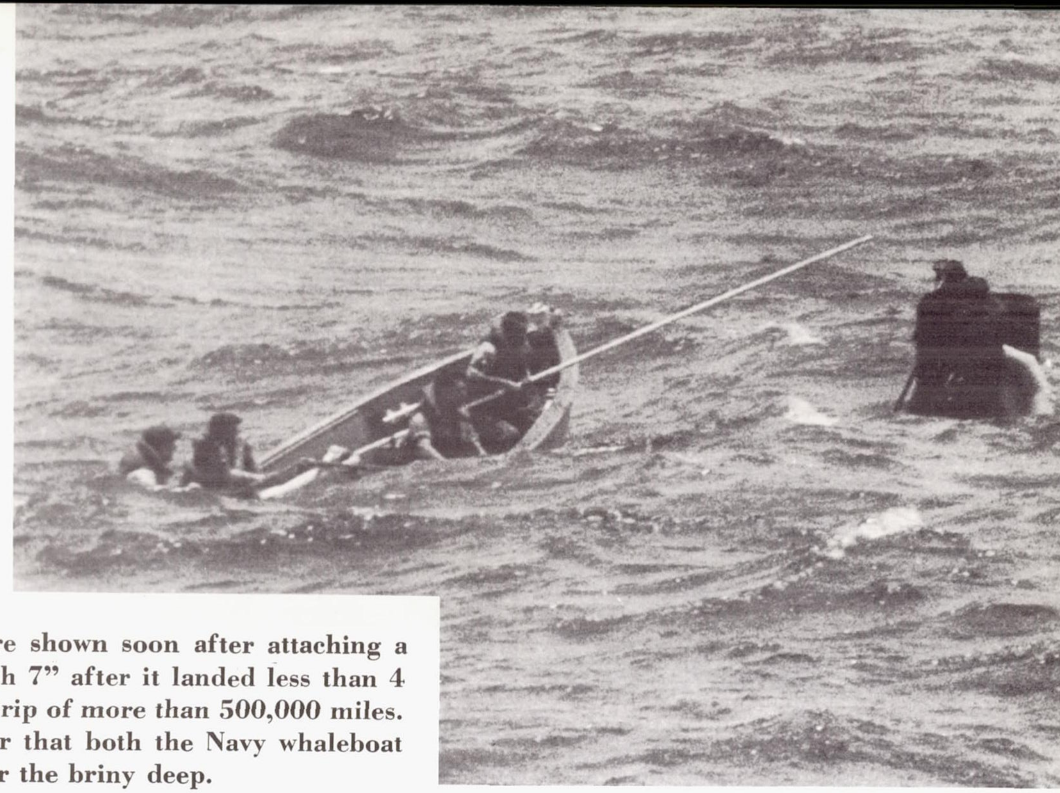
With the 21 planned landing areas, 55 preferred contingency landing sites were selected around the globe to offer the spacecraft a planned or preferred landing area approximately every 30 minutes throughout the 34-hour mission.



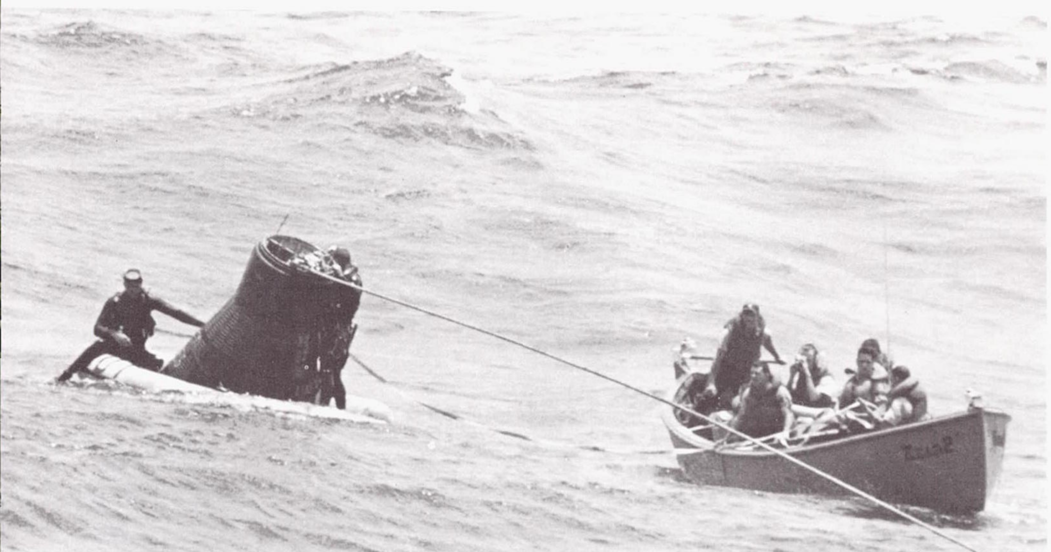


Above and to the right is a four-photo sequence of the actual approach and landing of the "Faith 7" after the 34 hours and 20 minutes journey in space with Astronaut L. Gordon Cooper, Jr., at the controls.

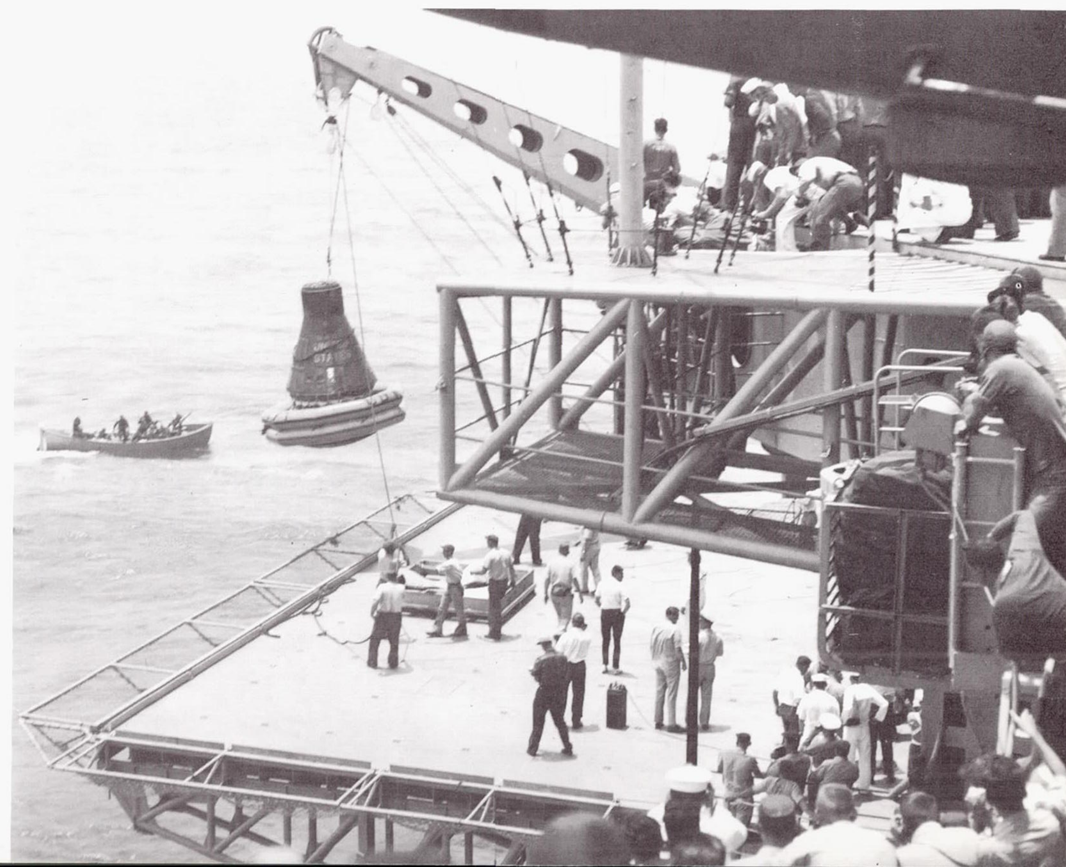




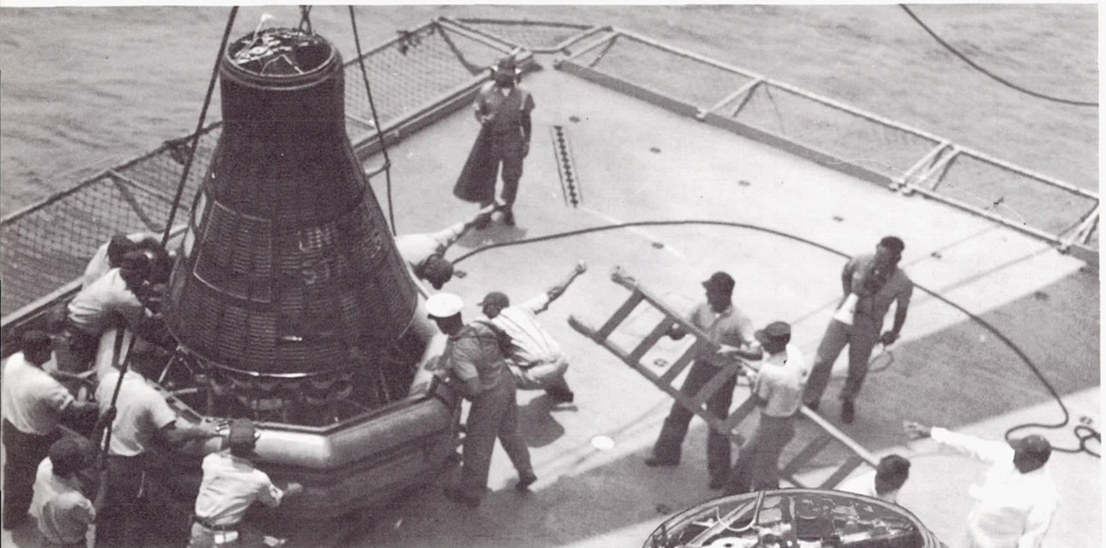
At left, three Navy frogmen are shown soon after attaching a flotation collar around the "Faith 7" after it landed less than 4 miles from its target following a trip of more than 500,000 miles. At right, a wave makes it appear that both the Navy whaleboat and the "Faith 7" are headed for the briny deep.



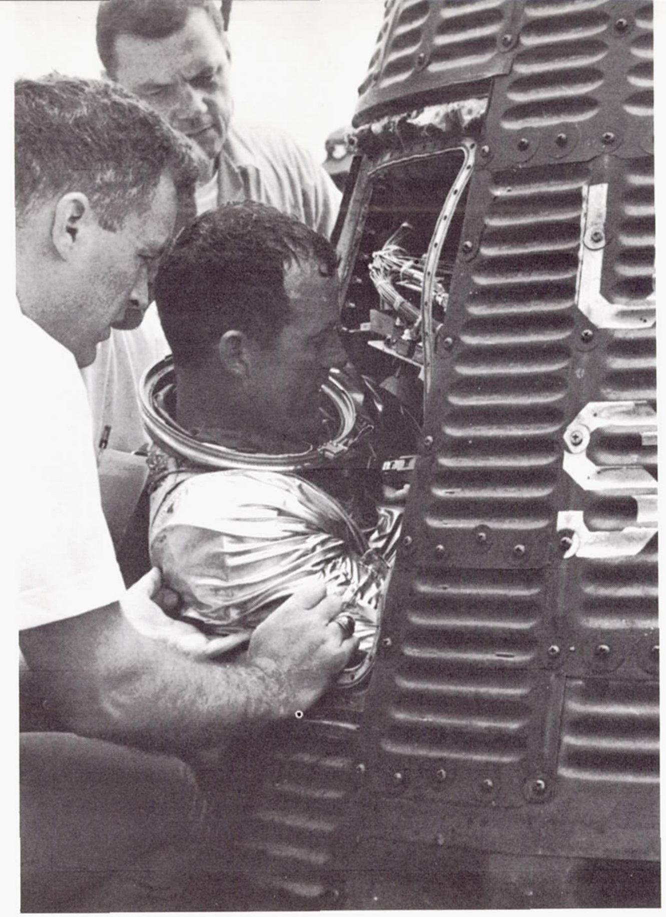
The whaleboat pulls away from the spacecraft as the line attached by the frogmen grows taut. At right, the "Faith 7" comes to rest again on a solid surface as it comes to rest on the deck of the *Kearsarge*.



Below, the "Faith 7" settles in place on the deck and workmen prepare to blow the hatch.



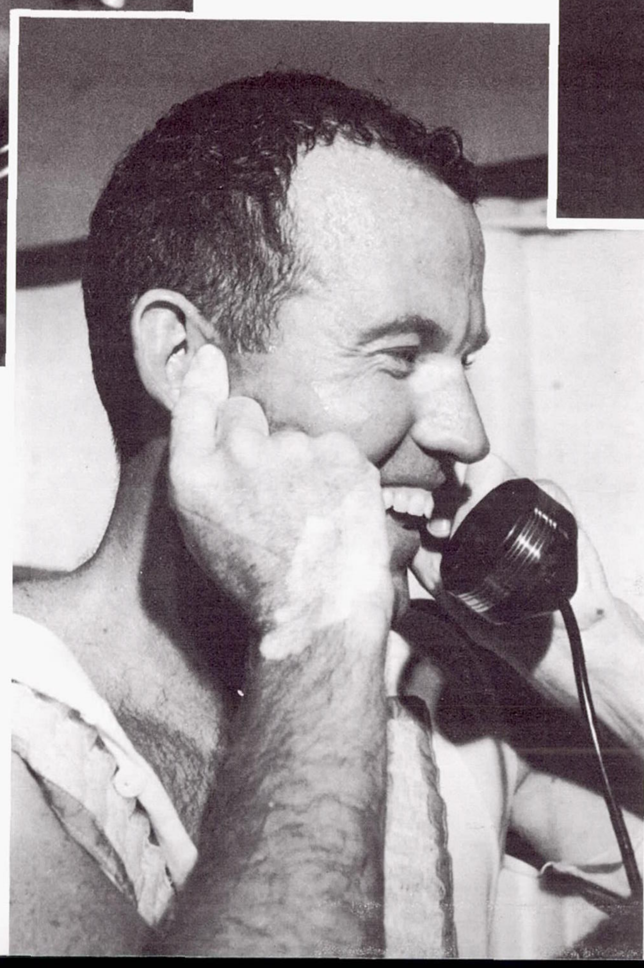
At right, Pollard assists Cooper from his spacecraft after taking his blood pressure.



Dr. Richard Pollard of Manned Spacecraft Center is the first to greet Cooper, after the hatch is blown.

A tired but happy Cooper stands on the deck of the *Kearsarge*.

Above, Cooper is shown receiving congratulations from President Kennedy while Pollard removes his glove. Moments later, he is shown, at the right, talking to his wife, Trudy, at their Texas home and telling her, "I feel fine."



Above, a smiling Cooper receives commemorative tokens of the historic occasion from Captain Eugene P. Rankin, skipper of the USS *Kearsarge.*

CHRONOLOGY OF PROJECT MERCURY FLIGHT TESTS

August 21, 1959—LITTLE JOE 1. This test was cancelled when a faulty wiring circuit prematurely actuated the escape system and carried the spacecraft out over the water. The main chute did not deploy and the spacecraft was destroyed at impact.

September 9, 1959—BIG JOE 1. This flight to investigate re-entry problems used a boiler-plate spacecraft on an Atlas launch vehicle. It accomplished all technical objectives and the spacecraft was recovered. Because of this success a second scheduled similar mission (BJ–2) was cancelled.

October 4, 1959—LITTLE JOE 6. Conducted at Wallops Island, Va., this test checked booster performance. Eight solid propellant rockets were used to develop 250,000 pounds of thrust at lift-off. The mission validated the aerodynamic and structural integrity of the booster and the use of the command destruction system.

November 4, 1959—LITTLE JOE 1–A. This test, also at Wallops Island, executed a planned abort under high aerodynamic load conditions. The boiler-plate spacecraft was recovered.

December 4, 1959—LITTLE JOE 2. This test at Wallops Island to check high altitude performance of the escape system carried a rhesus monkey, SAM, as test subject. All test objectives were met and the spacecraft, with occupant, was recovered.

January 21, 1960—LITTLE JOE 1–B. Another test at Wallops Island to evaluate the escape system under high aerodynamic load. Rhesus monkey, MISS SAM, was the test subject. The spacecraft and occupant were successfully recovered.

May 9, 1960—BEACH ABORT TEST. McDonnell's first production spacecraft and its escape system were tested in an off-the-pad evaluation of the escape rocket system at Wallops Island. The test was successful and the spacecraft was recovered.

July 29, 1960—MERCURY-ATLAS (MA–1). The first Atlas-booster flight with a production spacecraft with objectives of qualifying the spacecraft under maximum air loads and afterbody heating rate during re-entry conditions. The spacecraft contained only a minimum number of systems and no escape tower. The test was unsuccessful.

November 8, 1960—LITTLE JOE 5. Another of the series of tests at Wallops Island with a specific purpose of checking the spacecraft in an abort simulating the most severe conditions of an Atlas launch. Due to premature firing of the escape rocket, the spacecraft did not separate from the booster and was lost.

November 21, 1960—MERCURY-REDSTONE 1. This was the first unmanned Mercury-Redstone suborbital flight. An unscheduled engine cutoff resulted in premature jettisoning of the escape rocket when the booster was about 1 inch off the pad. The booster settled back and was damaged slightly. The spacecraft remained undamaged on the booster and was used on MR–1A.

December 19, 1960—MERCURY-REDSTONE 1–A. This repeat test of the MR–1 attempt was completely successful. The spacecraft reached an altitude of 130 statute miles, traveled 235 miles down-range and was recovered.

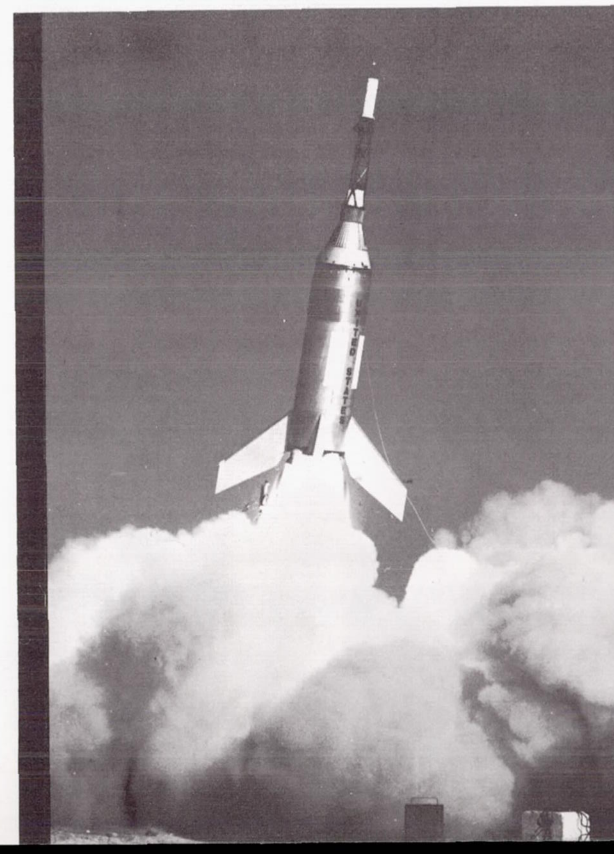
January 31, 1961—MERCURY-REDSTONE 2. This test carried HAM, a 37-pound chimpanzee, to a height of 157 statute miles and 418 statute miles down-range. During the landing phase, the heat shield made contact with the lower pressure bulkhead of the spacecraft driving two bolts through and causing a leak. Recovery of the spacecraft and HAM was made before much water had been taken aboard.

February 21, 1961—MERCURY-ATLAS 2. This test was held to check maximum heating rates during re-entry and to evaluate the modification resulting from the MA–1 flight. All test objectives were met and the spacecraft was recovered.

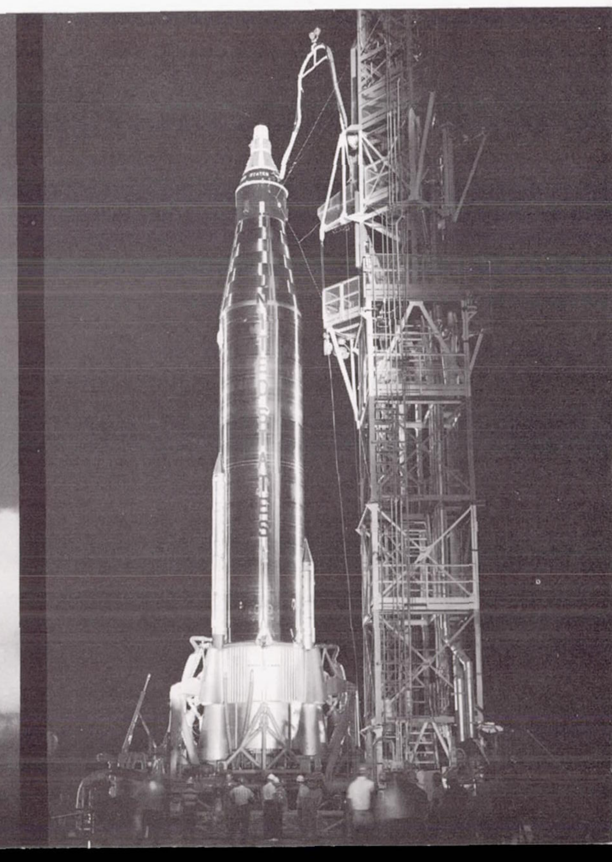
March 18, 1961—LITTLE JOE 5A. This was a repeat test of the unsuccessful LJ–5 test. Premature firing of the escape rocket before spacecraft release precluded the accomplishment of most of the test objectives. The spacecraft did not have structural damage and was refurbished for the LJ–5B test.

March 24, 1961—MERCURY-REDSTONE BD. This was a successful booster development test. The boiler-plate spacecraft was the one previously used on LJ–1B which provided the proper configuration and weight. All test objectives were met.

LITTLE JOE



BIG JOE



April 25, 1961—MERCURY-ATLAS 3. This was the first attempted orbit of a Mercury spacecraft with special instrumentation and a "mechanical astronaut." Due to booster guidance malfunction, the booster was destroyed by the Range Safety Officer approximately 40 seconds after lift-off. The spacecraft performed a successful escape maneuver, was recovered and refurbished for the MA–4 test.

April 28, 1961—LITTLE JOE 5B. This was the third test of the escape system under maximum exit dynamic pressure conditions. The test objectives were met and the spacecraft recovered.

May 5, 1961—"FREEDOM 7", MERCURY-REDSTONE 3. This was the first manned suborbital flight with Astronaut Alan B. Shepard, Jr., as pilot. The spacecraft reached an altitude of 116.5 statute miles and a range of 302.8 statute miles. The mission was completely successful.

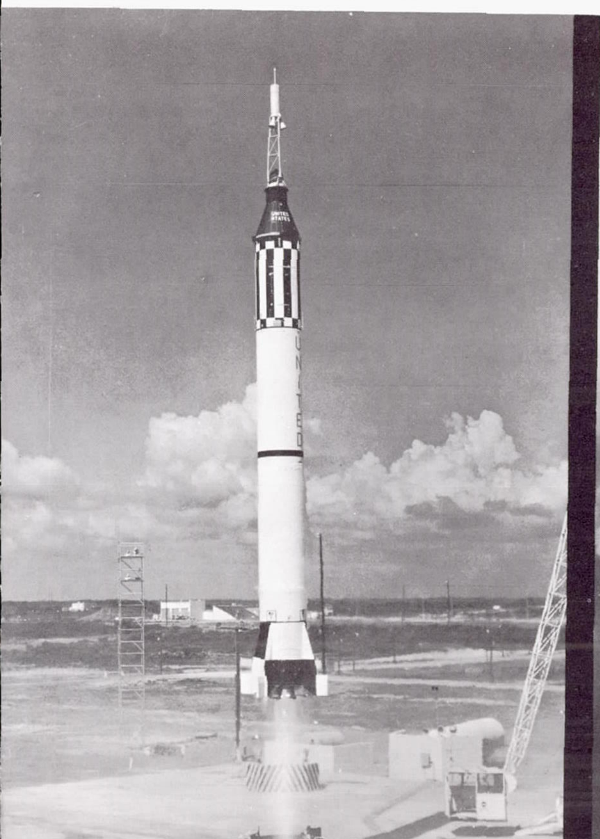
July 21, 1961—"LIBERTY BELL 7", MERCURY-REDSTONE 4. This was the second and final suborbital flight of the Mercury program. Astronaut Virgil I. Grissom was the pilot. The flight path was approximately the same as in the MR–3 mission. The spacecraft attained a height of 118.3 statute miles and traveled down-range 302 statute miles. The mission was a success except for the recovery phase. Due to premature actuation of the side hatch, water shipped into the spacecraft and made it so heavy the helicopter could not recover it and it sank in 2,800 fathoms of water. Grissom was in the water about 4 minutes before being rescued but was found to be in excellent condition.

September 13, 1961—MERCURY-ATLAS 4. The unmanned spacecraft successfully made an earth orbit, reaching an apogee of 142.1 statute miles and a perigee of 98.9 statute miles. All test objectives were met and the spacecraft was recovered.

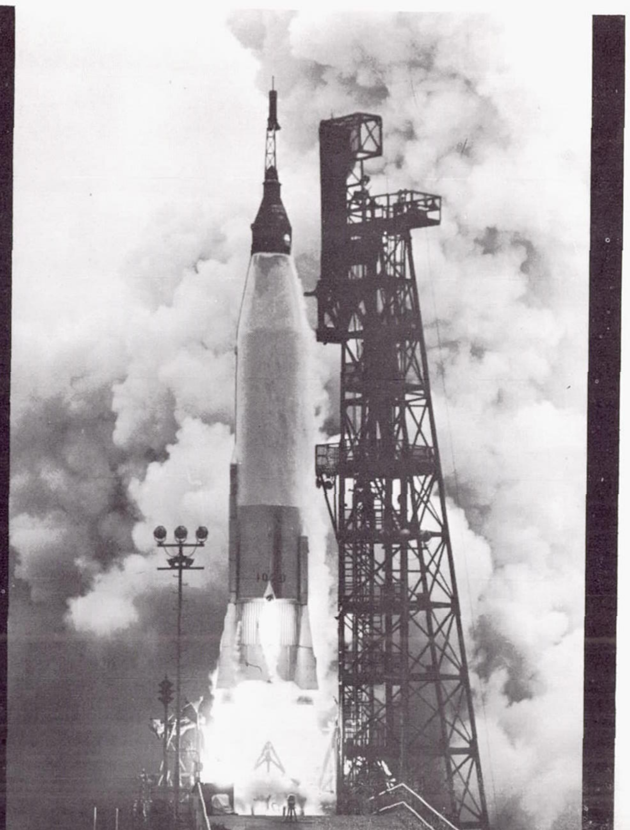
November 1, 1961—MERCURY-SCOUT 1. This test was to orbit a communication package to evaluate the capability of the Mercury Tracking Network. The test terminated after lift-off because of erratic booster oscillation which increased in magnitude until the missile apparently broke up.

November 29, 1961—MERCURY-ATLAS 5. This flight with chimpanzee ENOS aboard successfully orbited the earth twice before the command to return was given due to increasing inverter temperature and other than nominal attitude control. Enos was in excellent condition. Apogee of 147.4 statute miles and perigee of 99.5 statute miles was attained.

MERCURY-REDSTONE



MERCURY-ATLAS



February 20, 1962—"FRIENDSHIP 7", MERCURY-ATLAS 6. This was the first United States manned orbital spaceflight with Astronaut John H. Glenn, Jr., as pilot. The 80,000-mile flight of 4 hours, 55 minutes and 22 seconds duration, completed three orbits of the earth with a perigee altitude of 100.26 statute miles and an apogee of 162.17 statute miles. The success of the test showed the need of a human crew in space flights and man's adaptability to the space environment.

May 24, 1962—"AURORA 7", MERCURY-ATLAS 7. This flight, the second United States manned, three-orbital spaceflight by Astronaut M. Scott Carpenter was approximately the same as MA–6. Perigee altitude of 99.97 statute miles and apogee of 166.82 statute miles were reached. The test verified MA–6 observations and contributed further space science information. It was completed successfully except for a delayed retrofire that resulted in a landing 250 miles beyond the planned recovery area.

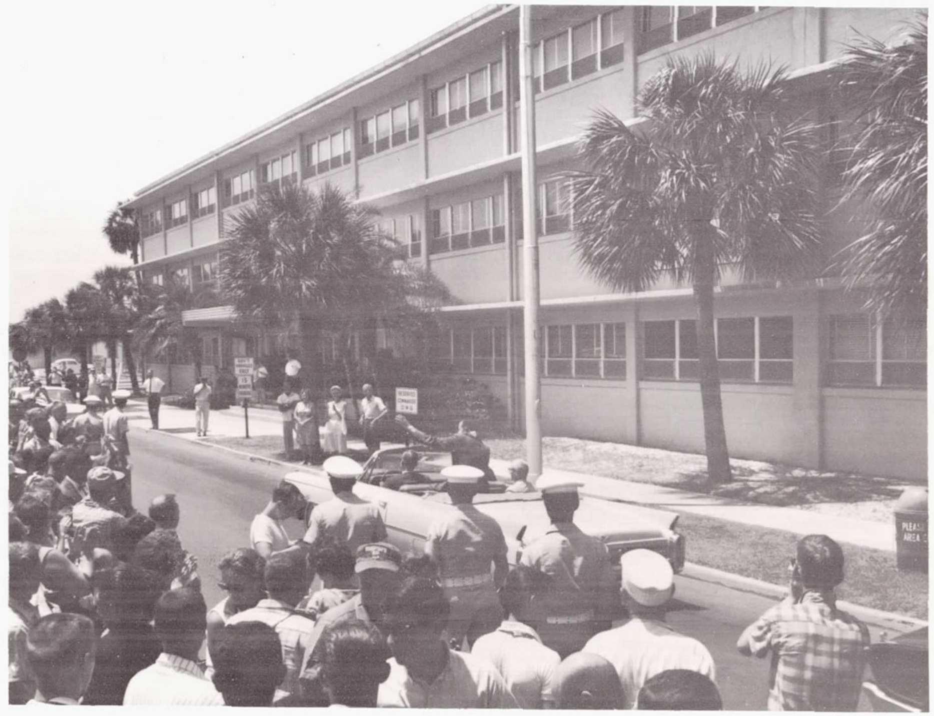
October 3, 1962—"SIGMA 7", MERCURY-ATLAS 8. This six-orbit flight by Astronaut Walter M, Schirra covered approximately 160,000 miles and reached an apogee altitude of 175.84 statute miles and a perigee of 100.00 statute miles. The 9-hour and 13-minute mission was terminated in the Pacific by a pinpoint landing in the center of the prime recovery area approximately 270 miles northeast of Midway Island. The test of man's capabilities in space environment and the engineering concepts of the spacecraft and supporting systems were completely successful.

May 15–16, 1963—"FAITH 7", MERCURY-ATLAS 9. Astronaut L. Gordon Cooper orbited the earth 22 times to cover a surface distance of approximately 546,185 statute miles during the 34 hours, 20 minutes and 30 seconds of the United States' fourth orbital space flight. It reached an apogee altitude of 165.90 statute miles and a perigee of 100.12 statute miles. Despite the failure of two inverters which caused reentry to be made by the manual control system, it was so accurate that the landing was within 8,700 yards of the prime recovery ship in the Pacific.

While enroute by helicopter from the deck of the *Kearsarge* to Hawaii, Cooper prepares to throw a wreath on the sunken USS *Arizona* at Pearl Harbor as a special Armed Forces Day tribute to World War II dead. At upper right, he is shown after his arrival at Hickam Air Force Base and his reunion with his family. Hawaii's Governor, John A. Burns, is at his left. At the right is part of the crowd that gathered at Hickam Field to greet Cooper as he stepped on American soil for the first time after his flight.

Thousands of Hawaiians line the motorcade route from Hickam Field into Honolulu to greet Cooper who they consider a "Kamaaiana" (native son of Hawaii) at upper left. At left, the motorcade approaches the palm-lined entrance to Iolani Palace; and, above, the anticipation of the moment is reflected in the faces of young and old alike as Cooper's car approaches the Palace.

At left, ceremonies for the returning astronaut in Honolulu include traditional hula dancers in front of Iolani Palace. Above, Cooper, Trudy, Jan and Cam greet the Governor's wife during a reception in Cooper's honor at the mansion of Governor and Mrs. John A. Burns.



The returning astronaut and his family are shown returning to Cocoa Beach, Fla., above, as they step off the Air Force transport which flew them back from Honolulu. Cooper and Trudy are followed closely by Jan and Cam. At upper right, Cooper leaves the field at Patrick Air Force Base, accompanied by Astronaut Gus Grissom, and, at right he is shown waving to the crowd minutes later as he arrives at Building 425 for a medical debriefing.

Part of the crowd which lined Highway A1A from Patrick Air Force Base to the Mercury News Center to get a glimpse of Cooper is shown above. At upper right, from left to right, facing the news-hungry gathering are Project Mercury Operations Director Walter C. Williams, Manned Spacecraft Center Director Dr. Robert R. Gilruth, Cooper, and Dr. Robert C. Seamans, Jr., Associate Administrator of the National Aeronautics and Space Administration. At the right is another view of the post-flight news conference.

Members of the Project Mercury team are honored by the President in ceremonies in the Rose Garden at the White House, and receive NASA's Distinguished Service Medal. At upper left, G. Merritt Preston, Chief of MSC's Cape Operations, stands alongside Administrator Webb prior to receiving his medal. The scene is repeated, lower left, as Christopher C. Kraft, Chief of Flight Operations Division for Manned Spacecraft Center, receives his award; and above, with the recipient, Kenneth S. Kleinknecht, Manager of Project Mercury. Others honored at the ceremony were Floyd L. Thompson, Director of Langley Research Center, and Maj. Gen. Leighton I. Davis, Commander of the Air Force Missile Test Center at Cape Canaveral, both of whom received NASA Distinguished Service Medals. The President presented NASA group achievement awards to Rear Admiral Harold G. Bowen, Jr., Chief of Cruiser-Flotilla 4, for the recovery forces; and to Maj. Gen. Ben I. Funk, head of the Air Force Space System Division, for its work in managing and developing the Atlas.

President Kennedy says good-bye to Cooper on the steps of the north portico of the White House. Shortly before, the President had pinned the National Aeronautics and Space Administration's Distinguished Service Medal on the astronaut.

Below, Cooper waves to the crowd along Pennsylvania Avenue as the motorcade moves to the Capitol.

Cooper is greeted by an enthusiastic crowd on his arrival at the Capitol prior to addressing a joint session of the Congress, above. At upper right, he is accompanied by his mother, Mrs. Hattie Cooper, Vice President Johnson, Trudy, Speaker of the House John McCormack, and Mrs. Johnson as they depart from the Capitol. At right, he is pictured as he helps himself to the "Faith 7" dessert at a lunch in his honor at the State Department.

The picture at left shows Cooper's car (second in line) as it makes its way slowly up New York City's Broadway, renamed Mercury Way for the day, as part of the 2,900 tons of ticker tape, confetti, etc., comes showering down from above. Below is part of the largest crowd ever to honor anyone in a New York City parade. The official "guesstimate" by officials put the crowd at 4½ millions.

Another example of the density of the crowd in New York is shown above as Cooper, Trudy, and the Vice President look on in wonderment.

NASA Administrator James E. Webb, left, smiles broadly after being presented with the New York City Gold Medal of Honor by Mayor Richard Wagner, as Cooper and Vice President Johnson stand by during the ceremony at the Waldorf Astoria.

Following the luncheon at the Waldorf, children in the official party were treated to a tour of the city and a ride on a fireboat. Pictured above, left to right, are Charlene Berry, daughter of Flight Surgeon Dr. Charles Berry; Cam Cooper at the helm, and Linda Kleinknecht, daughter of Mercury Project Manager Kenneth Kleinknecht.

One of the most thrilling moments of the many honors bestowed upon Cooper was his surprise meeting with J. Heston Heald, of McLean, Va. Heald was the scoutmaster of Troop 10, Shawnee, Okla., in which Cooper earned the rank of Life Scout. The meeting took place at the Americana Hotel where Cooper addressed the opening session of the 53d annual meeting of the National Council of the Boy Scouts of America. He was also given a citation for his "bravery, skill, and self-reliance in America's longest orbital flight in space."

Cooper made the last "Yankee" appearance of his whirlwind trip at the Newark Airport before boarding a NASA plane for Houston and still another parade. Governor Richard J. Hughes, at right, presented him with a silver medallion as a gift from the people of New Jersey.

Following the ceremony, Cooper, his family, and other members of the NASA party took the long walk to the plane with the Air Force major receiving an appropriate military salute in farewell.

Arriving at the Houston International Airport, Cooper is greeted by still another enthusiastic crowd. Above, Texas Attorney General Waggoner Carr welcomes Cooper home, while City Councilman Bob Webb (second from left) waits to add his congratulations. Mayor Lewis Cutrer (right) was the first to shake Cooper's hand as he stepped from his plane in Houston.

Before starting the final hometown parade in Houston, Cooper indicated the arduous nature of his post-flight parades, celebrations, and related activities when he said, "I believe the journeys we've had in the last few days have been longer than the flight I had in space—maybe not in mileage but in time and stress." Below, Cooper greets a final flag-waving crowd of Houstonians as the parade passes along Main Street in another rain of ticker tape.

Trudy Cooper pins the astronaut wings on her husband in a ceremony in the office of the Air Force Chief of Staff. The ceremony was held at the Pentagon on May 29.

Astronaut L. Gordon Cooper, Jr., addresses a joint session of the Congress on May 21.

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